61084D/P

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WILTRON

OPERATION AND MAINTENANCE MANUAL FOR THE MODEL 61084D RF PLUG-IN

THIS MANUAL COVERS THE 61084D RF PLUG-IN, USED IN THE 610 SERIES SWEEP GENERATOR MAINFRAME.

SERIAL NUMBERS

FOR 50Ω INSTRUMENTS WITH SERIAL NUMBERS IN WHICH THE LAST 5 DIGITS ARE 07001 AND ABOVE.

FOR 75Ω INSTRUMENTS WITH SERIAL NUMBERS IN WHICH THE LAST 5 DIGITS ARE 03001 AND ABOVE.

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WARRANTY

All products are warranted against defects in materials and workmanship for one year from the date of shipment except sweep generator oscillators, which have a two-year warranty period. Our obligation covers repairing or replacing products which prove to be defective during the warranty period and which shall be returned with transportation charges prepaid to WILTRON. Obligation is limited to the original purchaser. We are not liable for consequential damages.

MANUAL CHANGES

OPERATION AND MAINTENANCE MANUAL FOR THE MODEL 61084D RF PLUG-IN

Change #1

Model Number	Serial Numbers Affected
61084D, 50Ω	012001 and above
61084D, 75Ω	003001 and above

A. Make the following changes to Table 7-1 on page 7-3:

REF. DES.	WILTRON PART NO.	DESCRIPTION
R86	110-5.11-1	Resistor: MF, 5.11, 1/4W, 1%
U7	50-2	IC: Op Amp, LF356N

B. As indicated above, change R86 in Figure 8-2 on page 8-5.

C. As indicated above, change U7 in Figure 8-1 on page 8-3.

PCO 1825
8 January 1980

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SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION

This manual contains information needed to install, operate, and maintain the WILTRON Model 61084D RF Plug-In. This manual is organized as follows:

SECTION I, GENERAL INFORMATION, provides a general description of the plug-in, including specifications and accessory equipment.

SECTION II, INSTALLATION, contains instructions for installing the plug-in and for modifying earlier mainframes to improve system performance.

SECTION III, OPERATION, describes the function of each control and connector and gives procedures for several types of swept-frequency measurements.

SECTION IV, FUNCTIONAL DESCRIPTION, contains a functional description of all circuits at a block diagram level.

SECTION V, PERFORMANCE VERIFICATION, contains procedures for verifying system performance.

SECTION VI, MAINTENANCE, provides recalibration procedures, along with a troubleshooting chart.

SECTION VII, PARTS LIST, contains a list of replaceable parts and information for ordering.

SECTION VIII, SCHEMATIC DIAGRAMS, provides schematic diagrams with waveforms and voltage readings.

The APPENDIX provides a brief description of other WILTRON RF components and RF test instruments.

1-2. INSTRUMENTS COVERED BY MANUAL

This manual applies to 50Ω units with a serial number of 807001 or higher and 75Ω units with a serial number of 803001 or higher. The serial number decal is affixed to the rear panel (Figure 1-1).

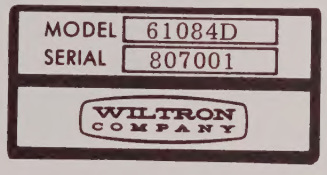


Figure 1-1. Serial Number Decal

1-3. WILTRON MODEL 61084D RF PLUG-IN DESCRIPTION

The Model 61084D RF Plug-In (Figure 1-2) is one of many RF plug-in sources for the Model 610 Series Sweep Generators. This plug-in is used with the Model 610B, 610C, or 610D Sweep Generator Mainframe to provide a swept- or fixed-frequency source from 1 to 1500 MHz. A 1-500 MHz band is supplied for improved low-frequency resolution. The whole band or any portion of it can be swept, depending upon the control settings on the mainframe. The RF output has a dynamic range of 79 dB and can be varied between +10 dBm and -69 dBm.

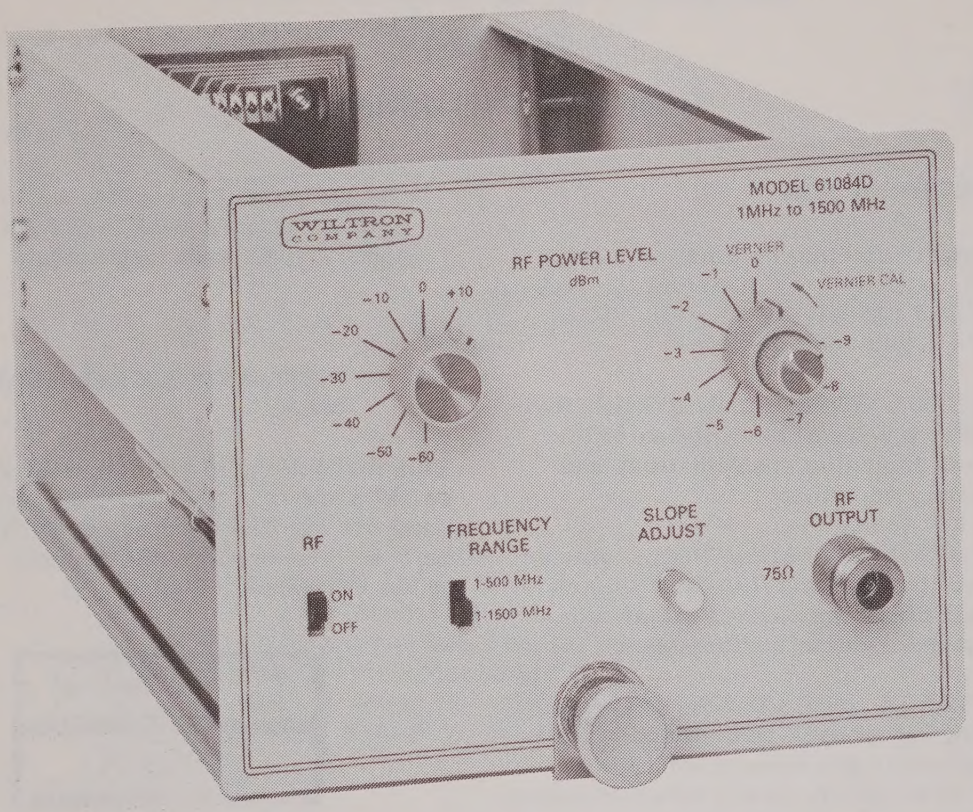


Figure 1-2. Model 61084D RF Plug-In

1-4. PERFORMANCE SPECIFICATIONS

The performance specifications for the WILTRON Model 61084D RF Plug-In are listed in Table 1-1. These specifications are valid only when the plug-in is installed in the WILTRON Model 610D Sweep Generator Mainframe.

1-5. PRECISION RF COMPONENTS AND INSTRUMENTS

An extensive line of precision RF components and RF test instruments are manufactured by WILTRON. When these precision RF components and instruments are used with the Model 610 Series Sweep Generators, they form a precision swept-frequency measurement system.

1-5.1 Precision RF Components

Table 1-2 lists the precision accessories which cover the frequency range of the Model 61084D Plug-In. Additional specifications of these accessories can be found in the WILTRON catalog.

1-5.2 Logarithmic Level Meter and Network Analyzer

The Model 501/501B Log Level Meter and the Model 560 Scalar Network Analyzer are used in several measurement examples in Section III. A brief list of the performance specifications of these instruments is given in the Appendix.

Table 1-1. Specifications for Model 61084D RF Plug-In

FREQUENCY RANGE:	1 to 1500 MHz
FREQUENCY BANDS	
BAND 1:	1 to 500 MHz
BAND 2:	1 to 1500 MHz
FREQUENCY ACCURACY:	±12 MHz at 25°C
LEVELED POWER OUTPUT:	10mW (+10 dBm) maximum
LEVEL VARIATION:	±0.2 dB maximum (internal leveling)
RESIDUAL FM (CW MODE):	7 kHz peak maximum (Note A)
HARMONICS:	>30 dB below maximum leveled power output, 5 to 1500 MHz; >20 dB below maximum leveled power output, 1 to 5 MHz
SPURIOUS:	>45 dB below maximum leveled power output
FREQUENCY DRIFT	
WITH TEMPERATURE:	±500 kHz/°C maximum
WITH 10% LINE VOLTAGE CHANGE:	0.001% maximum
WITH 3:1 MISMATCH:	500 kHz maximum
OUTPUT SWR:	1.4 maximum

Note A: Residual FM is measured at an AC line frequency of 60 Hz, with a modulation meter that has a 30 Hz to 28 kHz bandwidth. Residual FM is typically about twice the specified value when the AC line frequency is 50 Hz.

Table 1-2. Precision Measurement Accessories for Model 61084D RF Plug-In

SWR AUTOTESTERS		
63 Series	10 MHz to 4 GHz	36-40 dB Directivity
67 Series	10 MHz to 1 GHz	40 dB Directivity
SWR BRIDGES		
60 Series	5 MHz to 2 GHz	40 dB Directivity
62 Series	10 MHz to 1 GHz	40 dB Directivity
66 Series	5 MHz to 2 GHz	52-60 dB Directivity
68 Series	50 kHz to 32 MHz	50 dB Directivity
RF SAMPLING AND LEVELING DETECTORS		
71 Series	100 kHz to 3 GHz	Sampling Detector
73 Series	100 kHz to 4 GHz	Sampling Detector
710 Series	1 MHz to 2 GHz	Directional Detector 20 dB Directivity
TERMINATIONS		
26 Series	dc to 8 GHz	Termination
27 Series	dc to 2 GHz	Offset Termination
ADAPTERS		
32 Series	dc to 8 GHz	All major connectors
AIR LINE REFERENCE STANDARD		
16 Series	0.4 GHz to 8 GHz	1.002 SWR

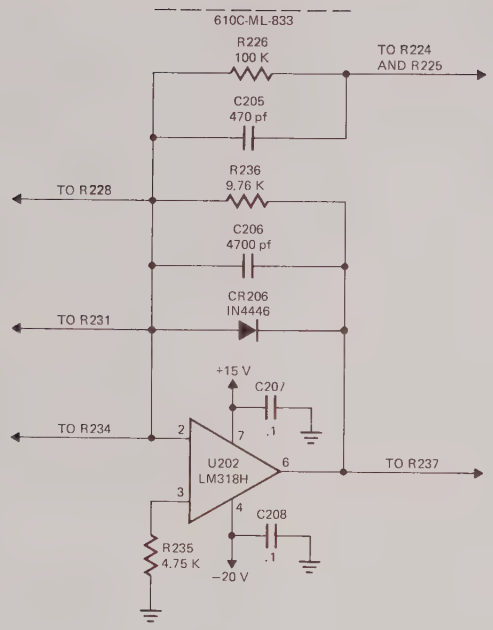


Figure 2-1A. Model 610D Frequency Instruction Circuit Before Modification

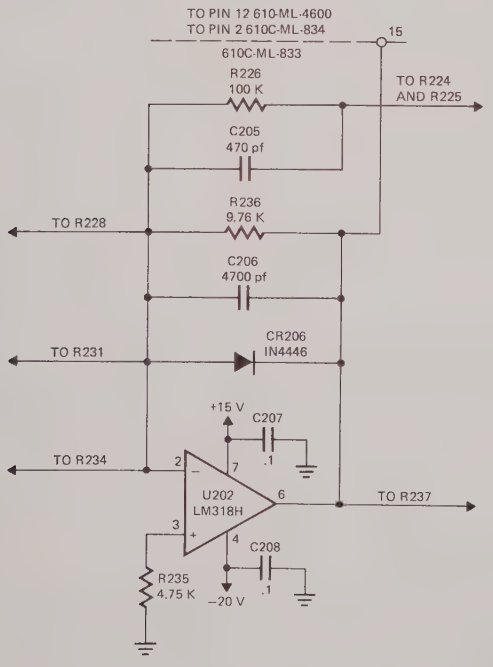


Figure 2-1B. Model 610D Frequency Instruction Circuit After Modification

SECTION II

INSTALLATION

2-1. INTRODUCTION

This section contains instructions for installing the 61084D RF plug-in, and for modifying earlier Model 610D, 610C, and 610B mainframes.

2-2. INSTALLING THE 61084D PLUG-IN

To install the plug-in in the mainframe, proceed as follows:

a. Switch mainframe power switch off.

b. Remove the 61084D dial scale from clips on side of plug-in and secure it in window on front panel of mainframe, using the two knurled screws provided.

c. Rotate latch knob on front panel of plug-in counter-clockwise to its stop.

d. Carefully slide plug-in into the compartment and push it firmly into place to engage the connectors.

e. Rotate plug-in latch knob fully clockwise to lock the unit in place.

2-3. REMOVING THE 61084D PLUG-IN

To remove the plug-in from the mainframe, proceed as follows:

a. Switch mainframe power switch off.

b. Rotate plug-in latch knob fully counter-clockwise to its stop.

c. Pull latch knob firmly to remove plug-in.

d. Remove 61084D dial scale from front panel and place it beneath storage clips on side of plug-in.

CAUTION

Install another plug-in dial scale in window to protect the dial pointers from damage.

2-4. MODIFICATIONS TO 610 SERIES MAINFRAMES

In Model 610D mainframes (Serial Numbers 501001 to 502050), it is necessary to modify the frequency instruction circuit to make it compatible with the 61084D Plug-In. In all Model 610B and 610C mainframes, modification of the external leveling circuit is recommended for improved overall system performance.

2-4.1 Model 610D Frequency Instruction Circuit Modification

NOTE

Modification is required only on 610D mainframes with a serial number between 501001 and 502050.

The schematic diagram in Figure 2-1A (opposite page) shows the affected portion of the frequency instruction circuit before modification. Figure 2-1B (opposite page) shows the circuit after modification. To perform the frequency instruction circuit modification, proceed as follows:

a. Remove top cover of mainframe.

b. On Frequency Instruction PC Board connector, move orange/white/black wire from pin 11 to pin 15.

c. On Frequency Instruction PC Board connector, move orange wire from pin 11 to pin 15.

d. On the PC side of Frequency Instruction Board, install a jumper from the junction of R237 and pin 6 of U202 to PC Board pin 15.

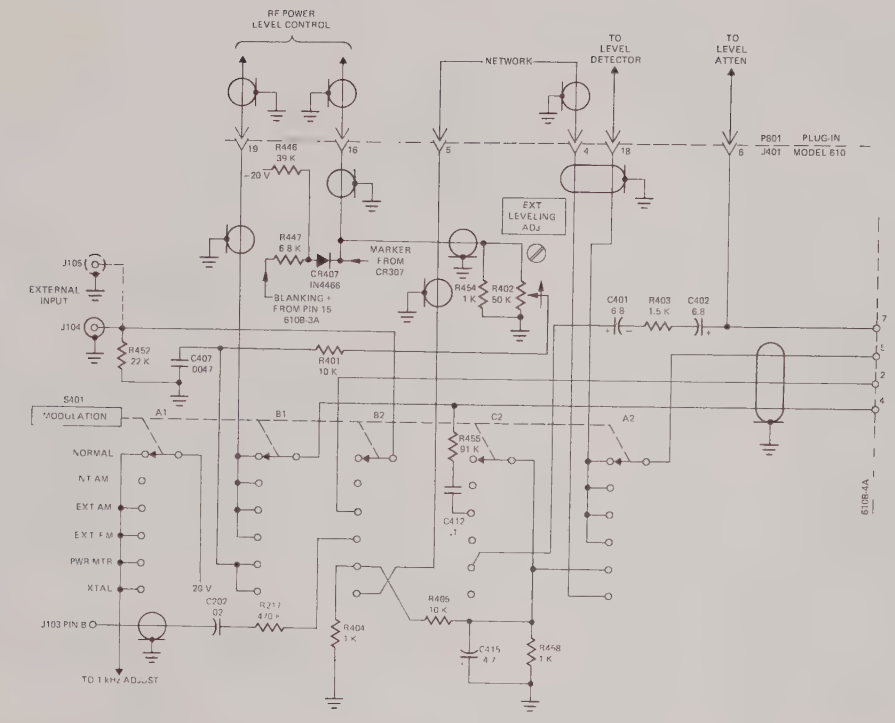


Figure 2-2A. Model 610B External Leveling Circuit Before Modification

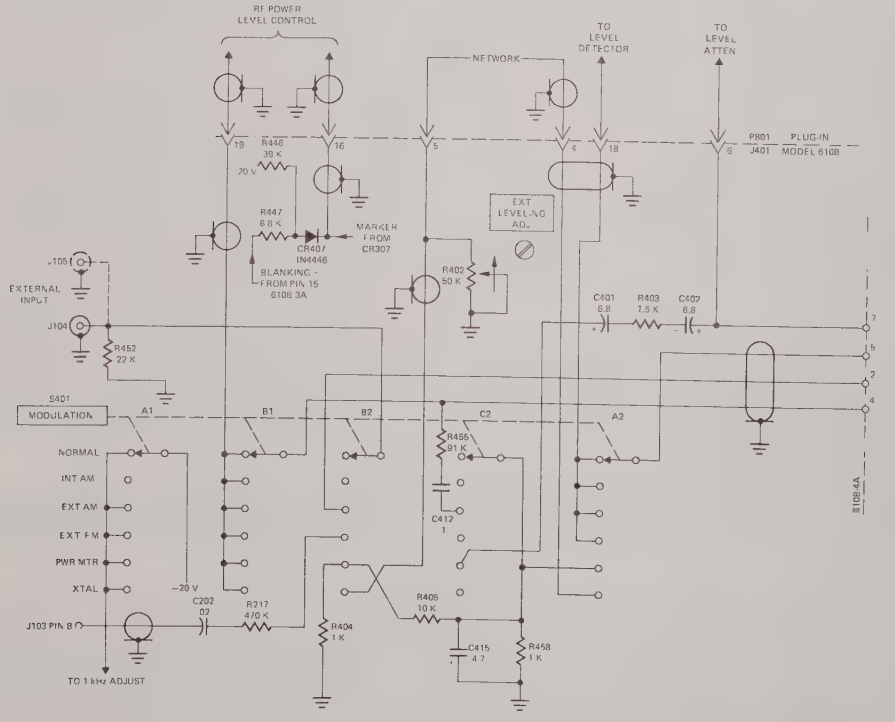


Figure 2-2B. Model 610B External Leveling Circuit After Modification

2-4.2 Model 610B External Leveling Circuit Modification

The schematic diagram in Figure 2-2A shows the external leveling circuit before modification. Figure 2-2B shows the circuit after modification. To perform the external leveling circuit modification, proceed as follows:

a. Remove bottom cover of mainframe.

b. To locate affected components on inside front panel of mainframe, see Figure 2-3A.

c. Remove R401 and R454.

d. Remove insulated wire between R402 and diode CR407 (diode CR407 is located on S302, VAR FREQ MARKER).

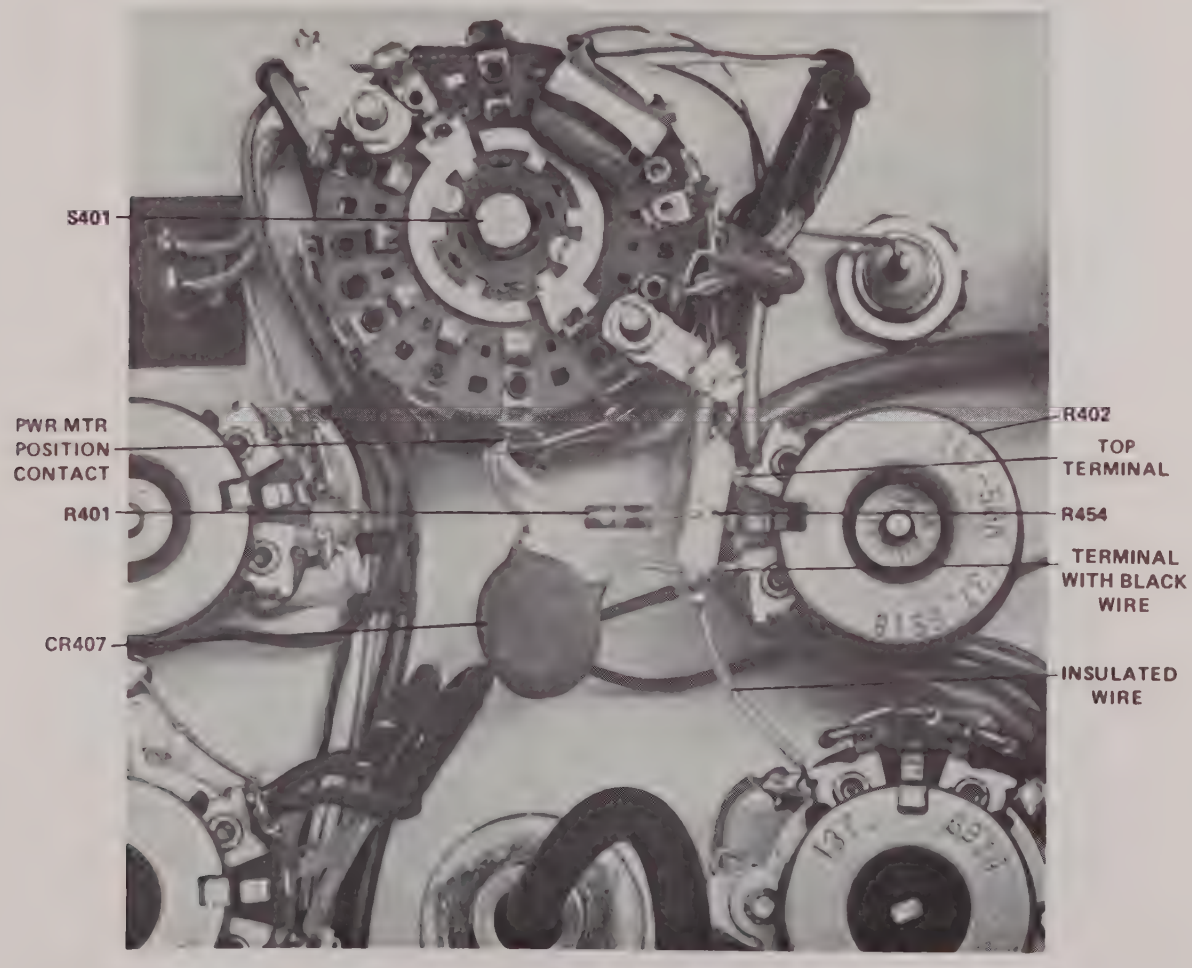


Figure 2-3A. Model 610B Mainframe Inside Front Panel, Rear View

e. On R402, connect a jumper between the wiper (center) terminal and the terminal that has the black wire connected to it.

f. Locate the XTAL position contact on bank B2 of S401, MODULATION switch, as shown in Figure 2-3B.

g. Connect a jumper between the top terminal on R402 and the switch contact in step f.

h. Locate the EXT FM position contact (Figure 2-3B) and the PWR MTR position contact (Figure 2-3A) on bank B1 of S401.

i. Connect a jumper between the two switch contacts in step h.

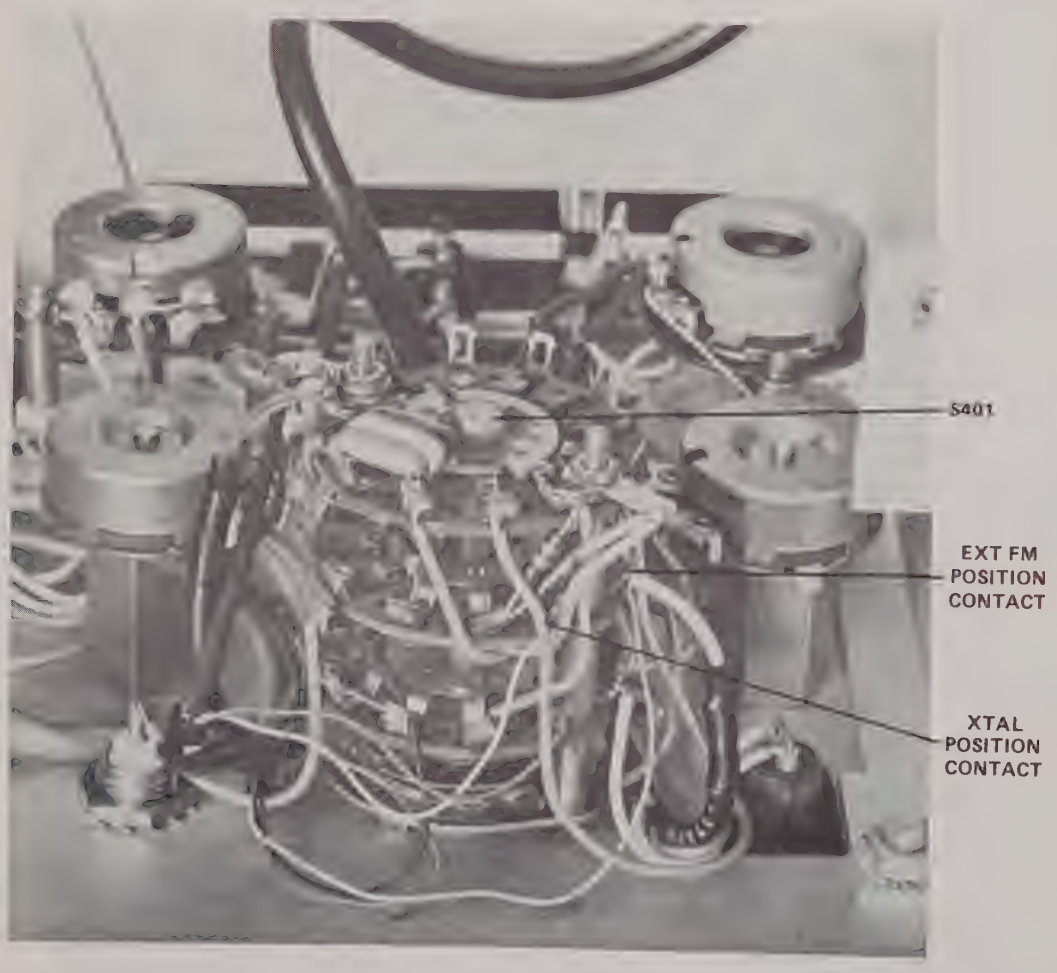


Figure 2-3B. Model 610B Mainframe Inside Front Panel, Bottom View

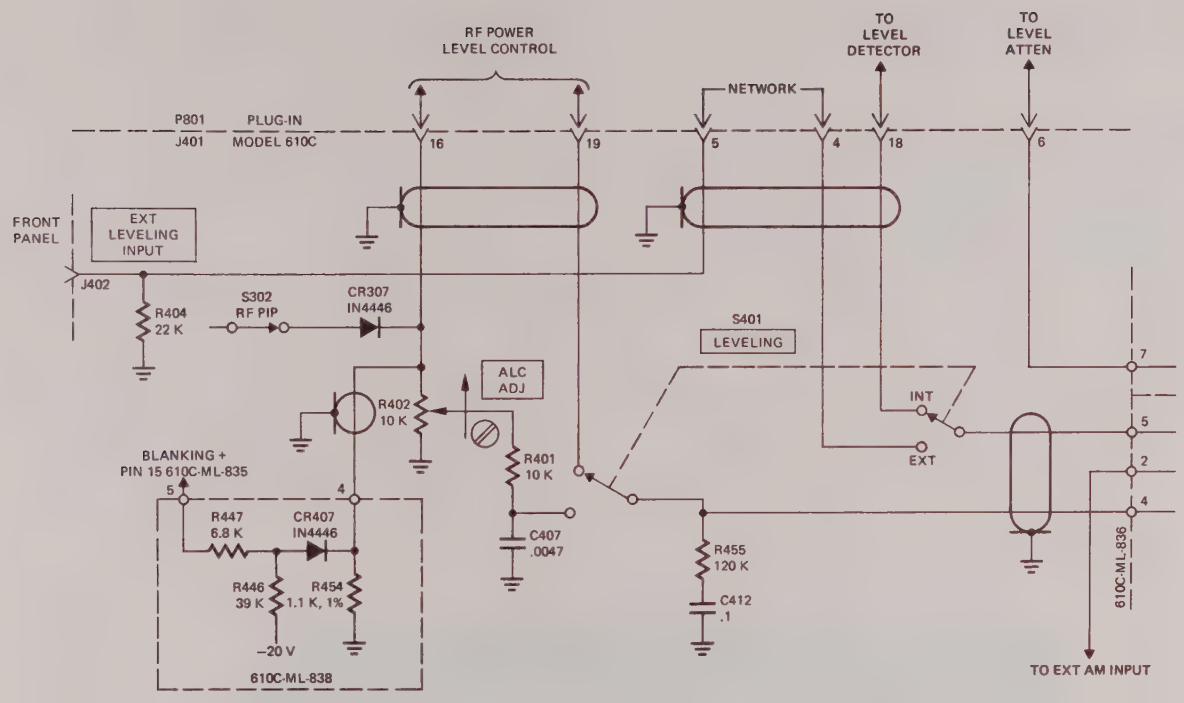


Figure 2-4A. Model 610C External Leveling Circuit Before Modification

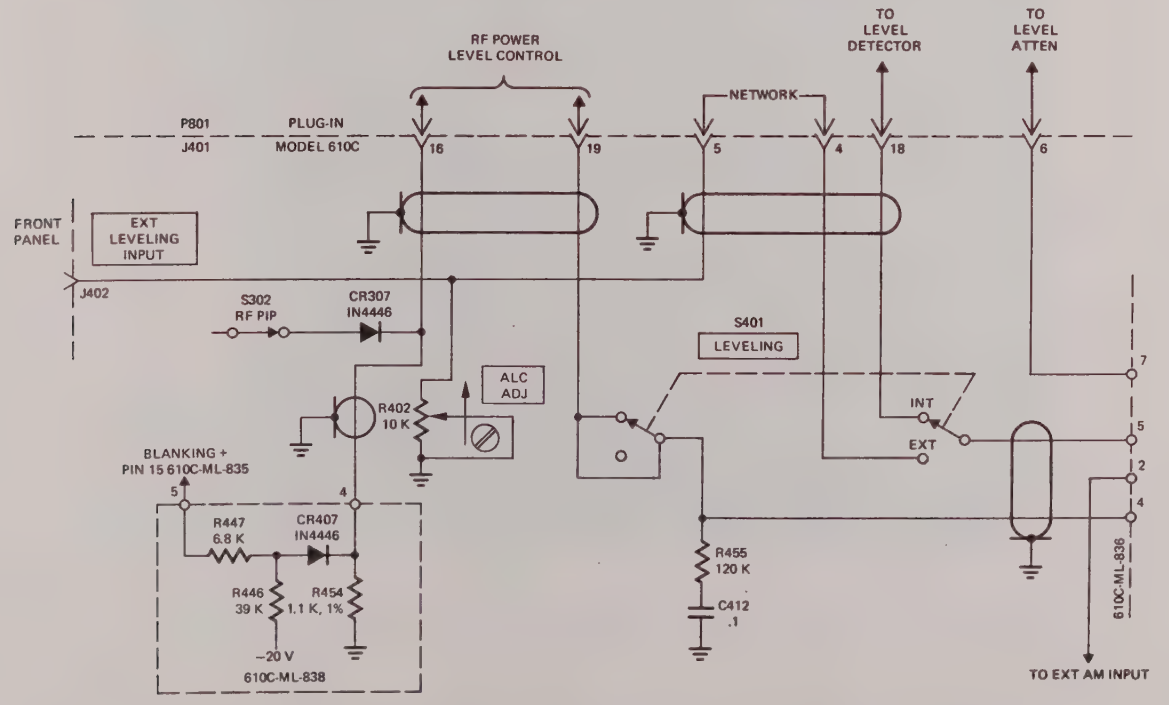


Figure 2-4B. Model 610C External Leveling Circuit After Modification

2-4.3 Model 610C External Leveling Circuit Modification

The schematic diagram in Figure 2-4A (previous page) shows the external leveling circuit before modification, while Figure 2-4B shows the circuit after modification. To perform the external leveling circuit modification, proceed as follows:

a. Remove bottom cover of mainframe.

b. To locate affected components on inside front panel of mainframe, see Figure 2-5.

c. Remove R401, R404, and C407.

d. On R402, disconnect cable number 10 and white and yellow wires.

e. Connect cable number 10 and white and yellow wires together.

f. Connect a jumper between top terminal on R402 and J402.

g. On R402, connect a jumper between the wiper (center) terminal and the terminal that has the black wire connected to it.

h. On S401, connect a jumper between the terminal that has the red wire from cable number 8 connected to it and the terminal that has the white wire from cable number 9 connected to it.

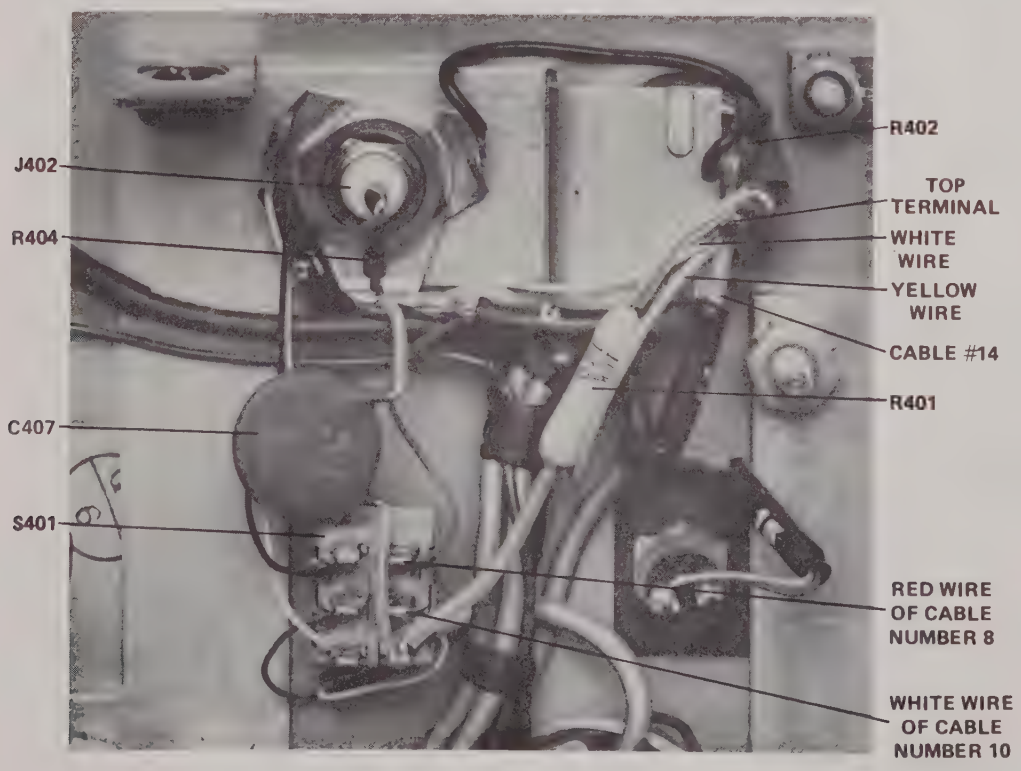


Figure 2-5. Model 610C Mainframe Inside Front Panel, Rear View

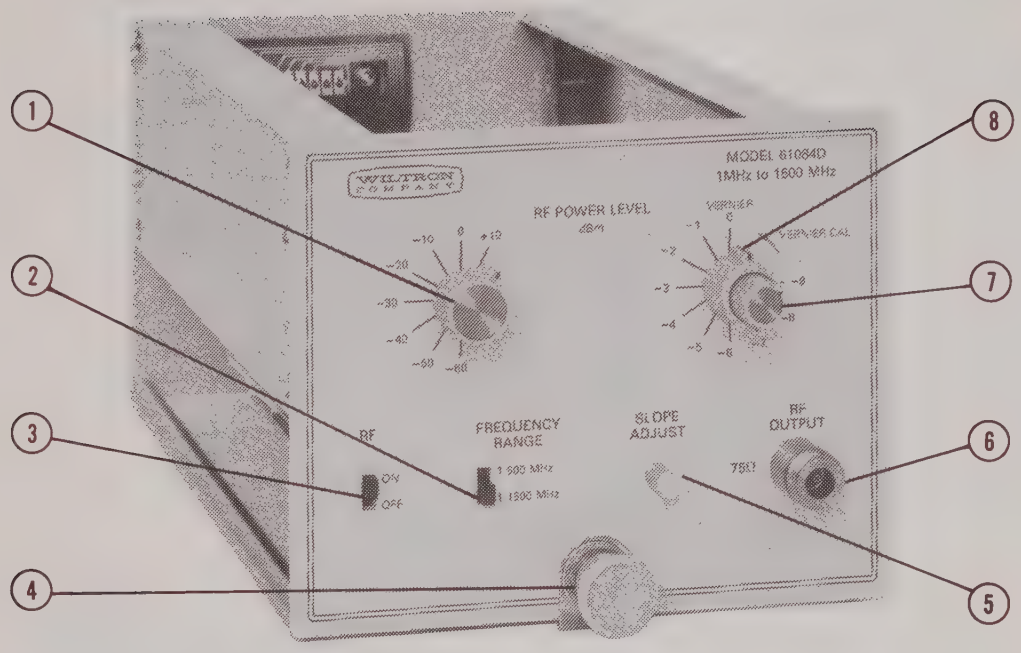


Figure 3-1. Model 61084D RF Plug-In, Front Panel Controls and Connector

(1) 10 dB Step Attenuator - Used with the 1 dB Step Attenuator and VERNIER control to select the output power. The power output is adjustable over a 79 dB dynamic range (+10 to -69 dBm).

(2) FREQUENCY RANGE - Selects either the 1-500 MHz or the 1-1500 MHz frequency range.

(3) RF ON/OFF - Turns the RF output either on or off.

(4) Latching Knob - Locks the plug-in in the mainframe.

(5) SLOPE ADJUST - Adjusts the slope of the RF output after external detection.

(6) RF OUTPUT - Supplies RF output from plug-in to device under test.

(7) VERNIER - Provides continuous 1 dB control range of the RF output.

(8) 1 dB Step Attenuator - Provides 10 dB control range, in 1 dB steps, of the RF output.

SECTION III
OPERATION

3-1. INTRODUCTION

This section describes the controls and connectors of the Model 61084D RF Plug-In, several types of SWR and transmission (insertion) loss or gain measurement configurations, and techniques for performing several swept-frequency measurements.

3-2. MODEL 61084D RF PLUG-IN CONTROLS AND CONNECTORS

3-2.1 Front Panel Controls and Connector

The front panel controls and connector of the 61084D are described in Figure 3-1 (opposite page).

3-2.2 Rear Panel Connectors

There are two connectors on the rear panel of the 61084D:

P1 is a 24-pin connector used to interconnect the plug-in and the mainframe. All dc power and control signals (except the RF Sample signal) go through P1.

P2 is a modified BNC connector used to interconnect the RF Sample signal from the plug-in and the Birdie Marker Mixer in the mainframe.

3-3. TYPICAL SWEPT-FREQUENCY MEASUREMENT CONFIGURATIONS

Two typical swept-frequency measurement configurations are described: (1) simultaneous transmission loss/gain and reflection measurement configuration using oscilloscope graticules and (2) direct-reading transmission loss/gain and reflection measurement configuration. Other swept-frequency measurement configurations and techniques are presented in the WILTRON SWR Autotesters and Bridges Instruction Manual.

3-3.1 Simultaneous Transmission Loss/Gain and Reflection Measurement Configuration

A configuration for simultaneous transmission loss/gain and reflection measurements is shown in Figure 3-2. The setup consists of a WILTRON Model 610D Mainframe, WILTRON Model 61084D RF Plug-In, WILTRON SWR Autotester, and a dual-channel oscilloscope. As shown in Figure 3-2, the Model 610D Mainframe supplies two signals: a tuning ramp for the RF plug-in and a sweep ramp for the oscilloscope. As a result, the tuning ramp from the mainframe produces a swept RF output from the RF plug-in, while the sweep ramp produces an external horizontal sweep on the oscilloscope.

The RF plug-in output is then applied to the device under test (DUT) through the test port of the SWR Autotester. A portion of that RF signal is reflected by the DUT back to the test port. From the test port

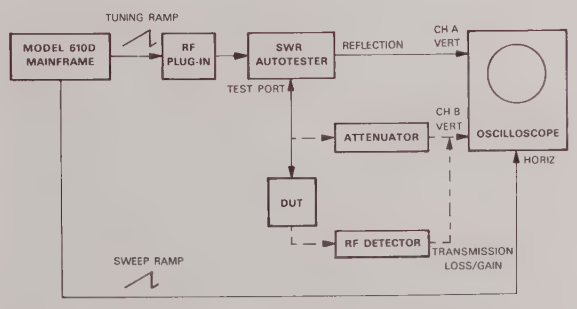


Figure 3-2. Simultaneous Transmission Loss/Gain and Reflection Measurement Configuration

this RF signal is detected by the internal SWR Autotester detector and applied to Channel A of the oscilloscope. The amount of signal reflection depends upon the impedance match of the DUT. The SWR of the DUT is then read directly from the calibrated oscilloscope SWR graticule (Figure 3-3). The reflection coefficient and return loss of the DUT can be found by using the conversion chart in Table 3-4, located at the end of this section. The return loss measurement configuration in Figure 3-2 can be modified, as shown by the dashed lines, to measure transmission loss/gain. The RF signal from the test port is applied to Channel B of the oscilloscope through the DUT and the external RF detector. Then, the amplitude of this signal is noted on the oscilloscope. Next, the DUT is disconnected from Channel B of the oscilloscope and a variable attenuator is connected in its place, as shown by the dashed line in Figure 3-2. The variable attenuator is varied until its vertical deflection on the oscilloscope equals the vertical deflection that was produced by the DUT. However, the direct-reading transmission loss/gain configuration is a more convenient and accurate method of measuring transmission loss/gain.

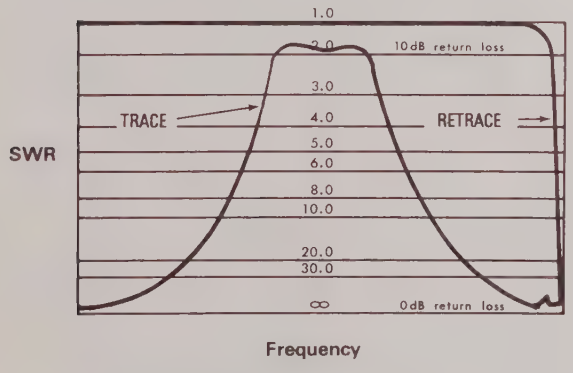


Figure 3-3. Calibrated Oscilloscope SWR Graticule

3-3.2 Direct-Reading Measurement Configuration

The direct-reading transmission loss/gain measurement configuration is shown by the dashed lines in Figure 3-4. This configuration is similar to the simultaneous transmission loss/gain and reflection measurement configuration, except that this configuration has a WILTRON Model 501/501B Logarithmic Level Meter. The logarithmic level meter converts the detected signal from the external RF detector to a logarithmic voltage that is displayed on the oscilloscope. Then, the transmission loss/gain of the DUT is read directly from the oscilloscope. Also, direct-reading return loss measurements can be performed.

The direct-reading return loss configuration is shown by the solid line in Figure 3-4. Again, the logarithmic level meter converts the detected signal from the SWR Autotester to a logarithmic voltage that is displayed on the oscilloscope. Consequently, the return loss of the DUT is read directly from the oscilloscope. The SWR or reflection coefficient of the DUT can be determined from the conversion chart in Table 3-4.

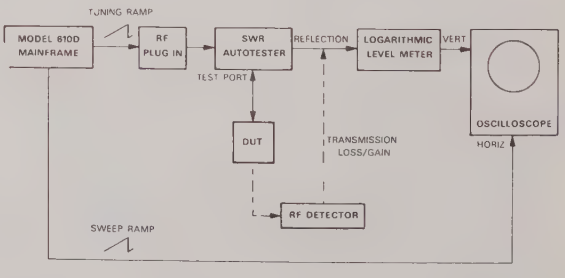


Figure 3-4. Direct-Reading Transmission Loss/Gain and Reflection Measurement Configuration

3-3.3 Scalar Network Analyzer Direct-Reading Measurement Configuration

The Model 560 Scalar Network Analyzer can be used instead of the 501 log meter and the oscilloscope for direct-reading measurements. A frequently-used test setup is shown in Figure 3-5. The reflected signal from the test device is connected to Channel A. The detected transmission signal is connected to Channel B. After subtracting system residuals which are stored in memory during calibration, the unit simultaneously displays return loss and transmission loss/gain. Determination of loss or gain is made by moving the trace vertically with the OFFSET control until the trace crosses the reference line at the desired frequency.

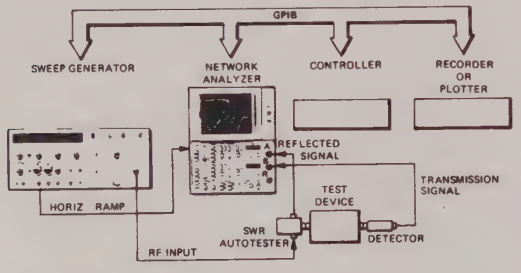


Figure 3-5. Test Setup for Simultaneous Network Analyzer Transmission Loss/Gain and Return Loss Measurements

3-4. SWEPT-FREQUENCY MEASUREMENT PROCEDURES

Three swept-frequency measurement procedures are provided: (1) SWR Measurement Using Calibrated Oscilloscope SWR Graticules, (2) Direct-Reading Transmission Loss/Gain and Reflection Measurements, and (3) External RF Power Leveling Configuration.

When performing these swept-frequency measurements, the following must be observed:

a. The characteristic impedances of the sweep generator, test cables, SWR Autotester or bridge, and device under test (DUT) must be equal.

b. The output of the plug-in must be leveled.

c. If the calibrated oscilloscope SWR graticules are used, the reflected power at the test port of the SWR Autotester or bridge must be between -18 dBm and -50 dBm.

d. The directivity of the SWR Autotester or bridge must be at least 20 dB greater than the return loss of the DUT.

3-4.1 SWR Measurements Using Calibrated Oscilloscope SWR Graticules

The procedure for performing SWR measurements using calibrated oscilloscope SWR graticules is presented in Table 3-1; the test setup is shown in Figure 3-6. SWR graticules are provided with each WILTRON SWR Autotester or bridge.

3-4.2 Direct-Reading Transmission Loss/Gain and Reflection Measurements

The procedures for performing direct-reading transmission loss/gain and reflection measurements are provided in Table 3-2; the test setup is shown in Figure 3-7.

3-4.3 External RF Power Leveling Configuration

The procedure for performing external RF power leveling is provided in Table 3-3; the test setup is shown in Figure 3-8. There are two modes of RF power leveling in the Model 610 Series Sweep Generator: internal and external. Although internal leveling is more convenient than external leveling, external leveling can offer advantages. For example, external leveling can correct for abnormalities caused by adapters or long cable runs to the DUT. Also, external leveling can improve the impedance match of the system, depending upon the quality of the external coupler and RF detector.

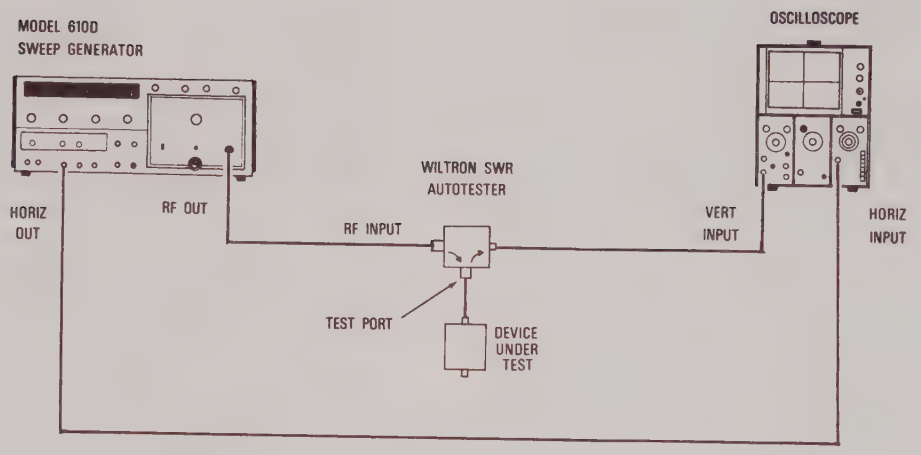


Figure 3-6. Test Setup for SWR Measurements Using Calibrated Oscilloscope SWR Graticules

Table 3-1. SWR Measurements Using Calibrated Oscilloscope SWR Graticules

1. Connect equipment as shown above except do not connect device under test (DUT) to Test Port of SWR Autotester.

2. Set front panel controls:

Model 610D Mainframe

VAR FREQ MARKER: INTENSITY
AMPLITUDE: Fully CCW
SWEEP MODE: AUTO
SWEEP TIME (SEC): .1-.01
VERNIER: Fully CW
FREQ SELECTOR: F1 TO F2
RETRACE RF: OFF
F1: Lower frequency of interest
VAR FREQ MKR: As desired
ΔF FREQ: 10
F2: Upper frequency of interest
LEVELING: INT
EXT ALC GAIN: Midrange
POWER: On

Model 61084D RF Plug-In

SLOPE ADJUST: Midrange
10 dB Step Attenuator: -20
1 dB Step Attenuator: 0
VERNIER: Fully CCW
FREQUENCY RANGE: As desired
RF: On

Oscilloscope

Vertical Input: dc
Vertical Input Polarity: Positive
Vertical Sensitivity: 1mV/div
Horizontal Input: External
Horizontal Input Polarity: Positive
Horizontal Sensitivity: 1V/div
POWER: On

3. Set Oscilloscope Sweep:

a. Adjust Focus and Intensity to obtain horizontal trace.

b. Adjust Vertical Position to place the retrace three divisions above centerline.

c. Adjust Horizontal Gain and Horizontal Position until trace is 10 divisions wide and centered horizontally.

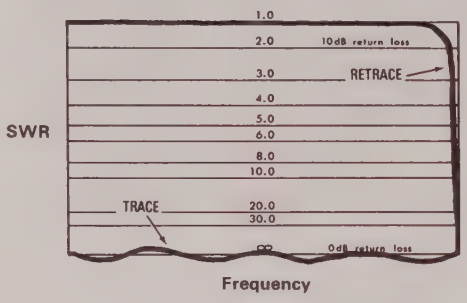
4. First Calibration:

a. Place the SWR graticule for 0 dB return loss over the oscilloscope display screen.

b. Adjust RF POWER LEVEL until trace is six divisions below retrace (see figure below). If trace cannot be positioned six divisions below the retrace, increase Vertical Sensitivity and repeat steps 3b and 4b.

Table 3-1. SWR Measurements Using Calibrated Oscilloscope SWR Graticules (Continued)

c. Set SLOPE ADJUST for best leveling.



First Calibration (with Open)

NOTE

Do not adjust 1 dB Step Attenuator or VERNIER after completing First Calibration.

5. First SWR Measurement:

a. Connect DUT to Test Port of SWR Autotester.

NOTE

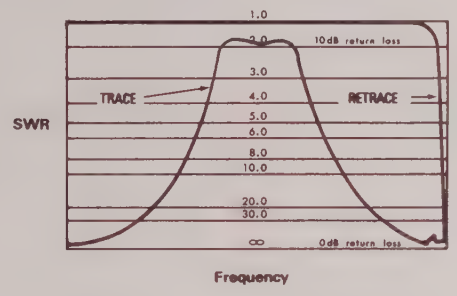
Check that the output of DUT is properly terminated.

b. Observe response curve of DUT. Set AMPLITUDE control fully CW. Adjust VAR FREQ MKR to place INTENSITY marker on the point of interest on response curve.

c. Set FREQ SELECTOR to ΔF. Adjust ΔF FREQ for desired sweep width of response curve. Adjust VAR FREQ MKR to center precisely the response curve on display screen.

d. Read approximate SWR from oscilloscope graticule. Select the return loss graticule for Final Calibration.

Example: If the SWR reading is between 1.0 and 2.0 but closer to 2.0, choose the 10 dB return loss graticule (see figure below). If the SWR reading is closer to 1.0, choose either the 20 dB or 30 dB return loss graticule.



First SWR Measurement
(Typical trace, Bandpass Filter)

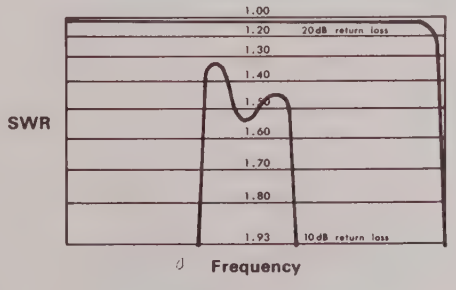
6. Final SWR Measurement:

a. Place the graticule selected in step 5d on the display screen.

b. Increase 10 dB Step Attenuator by the amount equal to the return loss graticule.

Example: Assume that the 10 dB Step Attenuator was set at -10 dBm following the First Calibration. Also, assume that the 10 dB return loss graticule was selected following the First SWR Measurement. Thus, the power output is increased 10 dB, from -10 dBm to 0 dBm.

c. Read the SWR of DUT from oscilloscope graticule (see figure below).



Final SWR Measurement

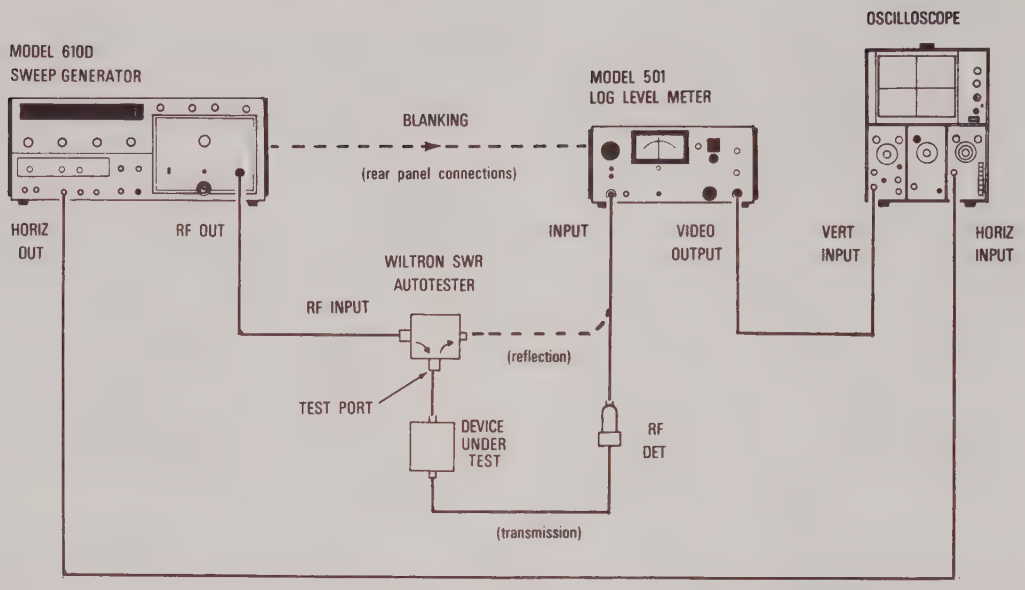


Figure 3-7. Test Setup for Transmission Loss/Gain and Reflection Measurements

Table 3-2. Direct-Reading Transmission Loss/Gain and Reflection Measurements

1. Perform the RF detector tracking adjustments in paragraph 3-2 of the Model 501 Logarithmic Level Meter Instruction Manual.

2. Connect the equipment as shown above except do not connect the device under test (DUT) to the Test Port of the SWR Autotester. Instead, connect the RF detector between the Test Port of the SWR Autotester and the INPUT of the logarithmic level meter.

3. Set equipment controls:

Model 610D Mainframe

VAR FREQ MARKER: INTENSITY
AMPLITUDE: Fully CCW
SWEEP MODE: AUTO
SWEEP TIME (SEC): .1-.01
VERNIER: Fully CW
FREQ SELECTOR: F1 TO F2
RETRACE RF: ON
F1: Lower frequency of interest
VAR FREQ MKR: As desired
ΔF FREQ: 10
F2: Upper frequency of interest
LEVELING: INT
EXT ALC GAIN: Midrange
POWER: On

Model 61084D RF Plug-In

10 dB Step Attenuator: -20
1 dB Step Attenuator: 0
VERNIER: Fully CCW
FREQUENCY RANGE: As desired
RF: ON
SLOPE ADJUST: Midrange

Model 501 Logarithmic Level Meter

Front Panel Controls:

SENSITIVITY: 10
PANEL METER: OFF
ZERO dB SET: Midrange
FILTER: OFF
POWER: On
OFFSET dB: 00.0
+/-: Minus (-)

Rear Panel Control:

BLANKING POLARITY: Positive (+)

Table 3-2. Direct-Reading Transmission Loss/Gain and Reflection Measurements (Continued)

Oscilloscope

Vertical Input: Ground
Vertical Input Polarity: Positive
Vertical Sensitivity: 1V/div
Horizontal Input: External
Horizontal Input Polarity: Positive
Horizontal Sensitivity: 1V/div
POWER: On

4. Set Oscilloscope Sweep:

a. Adjust Focus and Intensity to obtain horizontal trace.

b. Adjust Vertical Position to place the retrace three divisions above centerline.

c. Adjust Horizontal Gain and Horizontal Position until trace is 10 divisions wide and centered horizontally.

d. Set Vertical Input to dc.

5. Set Reference Level:

a. Adjust ZERO dB SET to place the trace on top of the retrace line.

b. Set SENSITIVITY to 0.5. Adjust ZERO dB SET to place the trace exactly on top of the retrace line.

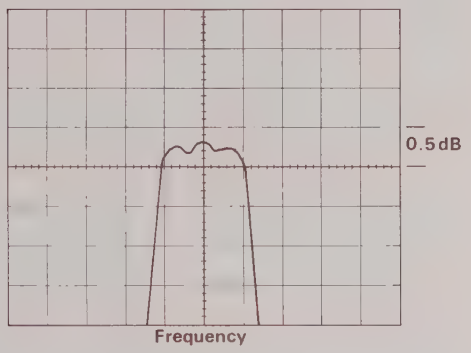
6. Transmission Loss/Gain of DUT:

a. Connect the DUT and RF detector as shown in Figure 3-7.

b. Observe response curve of device under test on the oscilloscope.

c. Set AMPLITUDE fully CW. Set VAR FREQ MKR to place INTENSITY marker on the point of interest on response curve. Set FREQ SELECTOR to ΔF. Adjust VAR FREQ MKR to center the response curve on the oscilloscope. Adjust ΔF FREQ for desired sweep width.

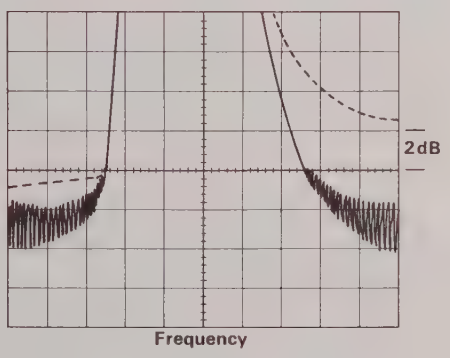
d. Adjust OFFSET dB to place the desired point of the trace on top of the retrace. The OFFSET dB counter now reads the transmission loss of the DUT (see figure below).



Transmission Loss
SENSITIVITY of 0.5 dB/DIV,
OFFSET of -2.2 dB.

NOTE

At low signal levels, select a slow sweep speed; otherwise the response curve will be distorted (see figure below).



SENSITIVITY is 2 dB/div, OFFSET is 36 dB. (Solid line is response obtained with a 10-s sweep time. Dotted line is response with sweep time of 0.01 s.)

Table 3-2. Direct-Reading Transmission Loss/Gain and Reflection Measurements (Continued)

7. Return Loss of DUT.

a. Set equipment controls as listed in step 3.

b. Disconnect DUT from the SWR Autotester.

c. Connect a cable between the output of the SWR Autotester and the Input of the logarithmic level meter, as shown in Figure 3-7.

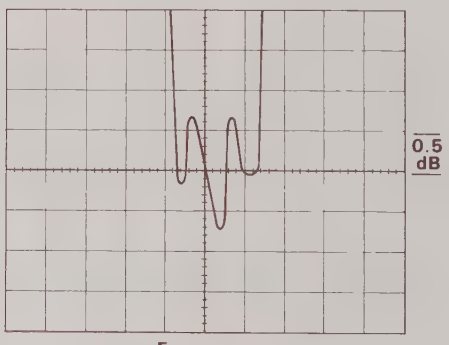
d. Set Reference Level (refer to steps 5a and 5b)

e. Connect DUT to Test Port of SWR Autotester. Connect the proper termination to the output of the DUT. Set SENSITIVITY to 10.

f. Observe response curve of DUT on the oscilloscope.

g. Set AMPLITUDE fully CW. Set VAR FREQ MKR to place INTENSITY marker on the point of interest on response curve. Set FREQ SELECTOR to ΔF. Adjust VAR FREQ MKR to center the response curve on the oscilloscope. Adjust ΔF FREQ for desired sweep width.

h. Set SENSITIVITY to 0.5. Adjust OFFSET dB to place the desired point of the trace on top of the retrace. The OFFSET dB counter now reads the return loss of the DUT (see figure below).



Return Loss.
SENSITIVITY 0.5 dB/div,
OFFSET -20.8 dB.

i. The return loss of the DUT can be converted to SWR and reflection coefficient by using Table 3-4.

SECTION IV

FUNCTIONAL DESCRIPTION

4-1. INTRODUCTION

This section describes the overall operation of the mainframe and the RF plug-in. Also, the theory of operation of the RF plug-in circuits is presented.

4-2. SYSTEM DESCRIPTION

The Model 610 Series Sweep Generator consists of the 610 Series Mainframe and a WILTRON RF plug-in. The mainframe provides the dc power and control signals for the RF plug-in. The RF plug-in is the RF oscillator source for the mainframe. The 61084D is used with the Model 610B, 610C, and 610D Mainframes to provide a swept- or fixed-frequency source from 1-1500 MHz.

4-2.1 Model 610D Mainframe

As shown in Figure 4-1, the Model 610D Mainframe consists of the following sections: Sweep Generator, Frequency Instruction, Marker Circuit, and Level Amp.

First of all, the Sweep Generator produces a sweep ramp (0-12V). There are four types of sweep ramps:

LINE SYNC - produces repetitive sweep ramps that are synchronized with the line frequency.

AUTO - produces repetitive sweep ramps that are synchronized with the internal sweep ramp generator.

MANUAL - produces no sweep ramp. The MANUAL potentiometer provides a voltage output variable between 0 and 12V. This voltage corresponds to a particular point on the sweep ramp.

TRIG - produces a single sweep ramp. This single sweep ramp is controlled by either the TRIG pushbutton on the front panel of the mainframe or by an external trigger source connected to the TRIGGER INPUT on the rear panel of the mainframe.

The rate of the sweep ramp is determined by the SWEEP TIME control. The sweep ramp is then applied to the Frequency Instruction section.

Secondly, the Frequency Instruction section determines the amplitude of the sweep ramp. This section has three modes of operation:

F1 TO F2 - provides a swept mode. The sweep ramp begins at a voltage determined by the setting of the F1 control and ends at a voltage determined by the setting of the F2 control.

ΔF - provides a swept mode. The sweep ramp is swept symmetrically about a point on the sweep ramp that is determined by the setting of the VAR FREQ MKR control. The amplitude of this ramp is determined by the setting of the ΔF FREQ control.

CW - provides a fixed mode. There are three CW modes: CW F1, CW MKR, and CW F2. The settings of the F1, VAR FREQ MKR, and F2 controls determine the fixed Frequency Instruction voltages for the CW F1, CW MKR, and CW F2 modes, respectively.

The Frequency Instruction ramp can also be modified by a variable frequency marker. This marker can identify a particular swept-frequency on an oscilloscope display.

Thirdly, the Marker Circuit generates three types of variable frequency markers:

RF PIP - produces a marker on a swept-frequency oscilloscope display by momentarily decreasing the RF output. The RF PIP occurs at a point on the Frequency Instruction ramp that is determined by the setting of the VAR FREQ MKR control.

INTENSITY - produces a dot on a swept-frequency oscilloscope display. The INTENSITY dot occurs at a point on the Frequency Instruction ramp that is determined by the setting of the VAR FREQ MKR control.

VIDEO - produces a negative marker on a swept-frequency oscilloscope display. The VIDEO marker occurs at a point on the Frequency Instruction ramp that is determined by the setting of the VAR FREQ MKR control.

Lastly, the Level Amp establishes a Level Reference for the Level Amplifier in the RF plug-in.

4-2.2 Model 61084D RF Plug-In, Overall Description

As shown in Figure 4-1, the Model 61084D RF Plug-In consists of the following sections: Linearizer, RF Section, Level Amplifier, and DC Power Supplies. First, the Frequency Instruction ramp from the Model 610D Mainframe is applied to the Linearizer section. Then the Linearizer section produces a shaped tuning ramp for the RF Section that produces a 1-1500 MHz fixed- or swept-frequency source. Furthermore, the control signals of the Level Amplifier maintain the RF power output at a constant level. The Level Reference signal from the mainframe, along with the signals from the 1 dB Step Attenuator and VERNIER control, establishes a reference level signal for the Level Amplifier. The RF Sample, which is a portion of the detected RF, is then compared with this reference level signal. If there is any difference between these two signals, the Automatic Level Control (ALC) signal then makes the appropriate correction. In addition, if the RF power output is adjusted too high to maintain leveling, the ALC signal causes the UNLEVELED light to go on. Finally, the DC Power Supplies provide the dc power for the plug-in circuits.

4-3. MODEL 61084D RF PLUG-IN DESCRIPTION

The Model 61084D RF Plug-In has four sections: (1) Linearization, (2) RF Section, (3) RF Power Leveling, and (4) DC Power Supplies. The four sections are described below. The Linearization section is described in detail in paragraph 4-3.5.

4-3.1 Linearization

As shown in Figure 4-2, the input to the Linearization section is the Frequency Instruction ramp. This ramp is buffered by the Ramp Buffer Amplifier. The gain of this amplifier is determined by the setting of the FREQUENCY RANGE switch. When this switch is in the 1-1500 MHz position, the output from the amplifier is a 0 to -10.0V ramp; when the switch is in the 1-500 MHz position, the output from the amplifier is a 0 to -3.33V ramp. The Frequency Instruction ramp is then applied to the Linearizer Amplifier. This amplifier modifies the Frequency Instruction ramp to a shaped tuning ramp. This shaped tuning ramp is then applied to the RF Section via the Lo Voltage-Tuned Oscillator (VTO) and the Hi VTO Drivers. Equally important, the CW Filter Driver circuit can reduce noise and residual FM. When the CW or MANUAL mode is selected and the rear panel FM/NORM switch on the Model 610D Mainframe is in the NORM position, the CW Filter Activate signal goes negative. This signal activates the CW Filter Driver. Then, the CW Filter Driver closes a relay to add capacitance across the Lo VTO and Hi VTO tuning lines. This capacitance reduces noise

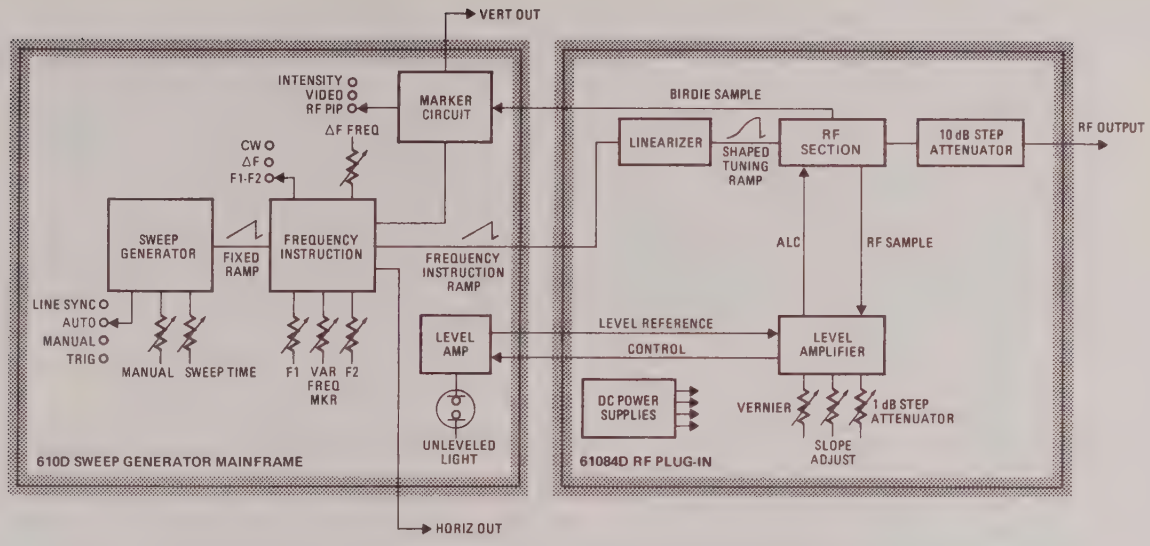


Figure 4-1. Model 610D Mainframe with 61084D RF Plug-In, Simplified Block Diagram

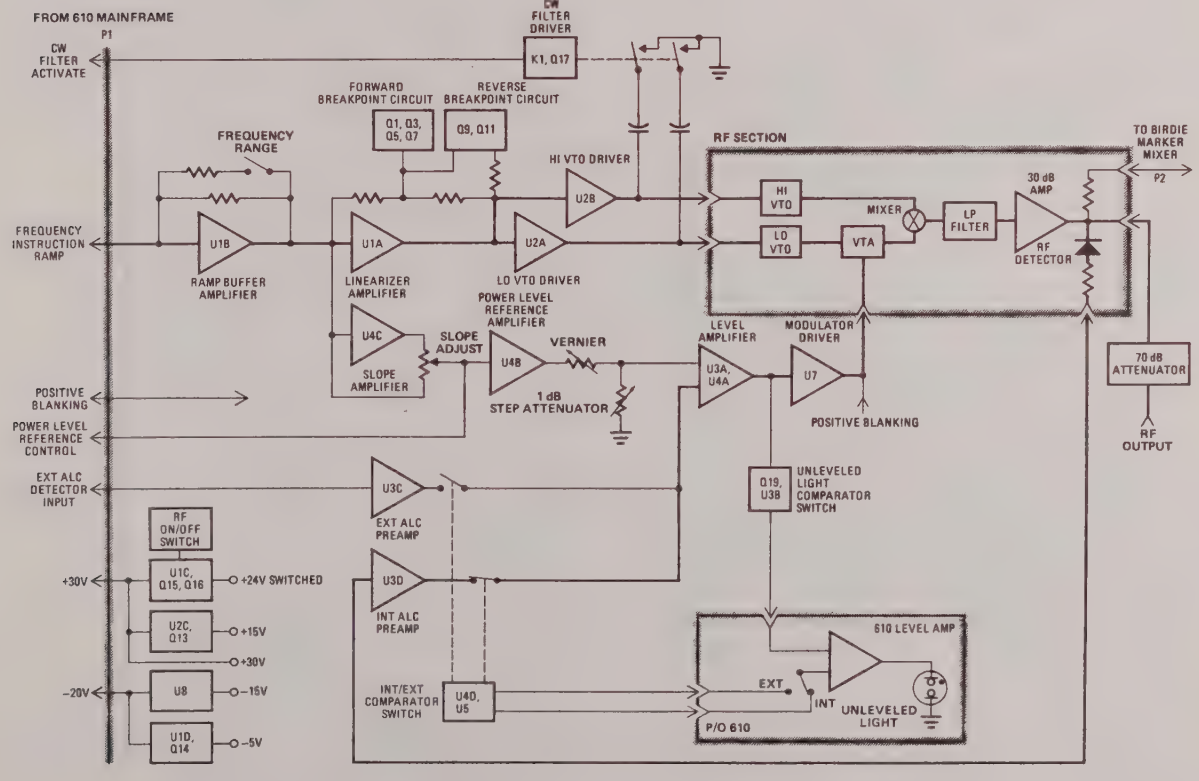


Figure 4-2. Model 61084D, Block Diagram

on the tuning ramp, and thus reduces residual FM on the RF output.

4-3.2 RF Section

As shown in Figure 4-2, the shaped tuning ramp from the Lo Voltage-Tuned Oscillator (VTO) and the Hi VTO Drivers is applied to the Hi VTO and the Lo VTO in the RF Section. The outputs from the Lo VTO and the Hi VTO are than mixed in a balanced mixer. Next, the mixer output is filtered by a Low-Pass (LP) Filter and then applied to the 30 dB Amp. The 30 dB Amp amplifies this signal and applies it to the RF OUT connector via the 0-70 dB Attenuator. Further, the Voltage-Tuned Attenuator (VTA) is used to provide RF power leveling control and external amplitude modulation. A portion of the RF output from the 30 dB Amp is detected by the RF Detector. This detected signal is then sent to the RF Power Leveling section.

4-3.3 RF Power Leveling

There are two modes of RF Power Leveling: internal (INT) and external (EXT). When the LEVELING switch is in the INT position, contacts on the Int/Ext Comparator Switch route the detected RF signal to the Level Amplifier via the Int Automatic Leveling Control (ALC) Preamp. Then, the Level Amplifier compares the detected RF signal with a reference level signal. The amplitude of the reference level signal is determined by the setting of the SLOPE ADJUST, VERNIER, and 1 dB Step Attenuator controls on the front panel. When the detected RF signal is compared with the reference level signal, the Level Amplifier amplifies the difference between these two signals and applies it to the Modulator Driver. The Modulator Driver then sends a correction signal to the Voltage-Tuned Attenuator (VTA) in the RF Section. The VTA supplies the necessary current to turn the RF Section on or off. If the RF power level is set too high to maintain RF power leveling, the Unleveled Light Comparator Switch turns on the UNLEVELED light.

When the LEVELING switch is in the EXT position, a dc input from an external negative RF detector must be connected to the EXT ALC INPUT connector to provide external RF power leveling. The external detected RF is then applied to the Level Amplifier via the Ext ALC Preamp. Then, the Level Amplifier compares the external detected RF signal with the reference level signal and amplifies any difference between these two signals. This signal is then fed to the Modulator Driver that sends a correction signal to the VTA.

4-3.4 RF Plug-In DC Power Supplies

The RF plug-in dc power supplies are derived from the mainframe -20V and +30V power supplies. There are four RF plug-in dc power supplies: (1) -15V, (2) -5V, (3) +24V switched, and (4) +15V. The -15V and -5V supplies are derived from the -20V mainframe power supply. On the other hand, the +24V switched and +15V supplies are derived from the +30V mainframe power supply. Furthermore, the RF ON/OFF switch turns either on or off the +24V switched supply, which turns either on or off the RF Section.

4-3.5 Linearization Section, Detailed

As shown in Figure 4-3, the Linearization section consists of forward and reverse breakpoint circuits. Each forward and reverse breakpoint circuit modifies a particular portion of the tuning ramp.

A forward breakpoint circuit increases the gain of its particular portion of the tuning ramp. Since forward breakpoint circuits 1 through 4 operate in a similar manner, only forward breakpoint circuit 1 will be described in detail. As shown in Figure 4-3, the Frequency Instruction ramp is applied to the Linearizer Amplifier and R16. The rising ramp voltage at the junction of R16 and R18 causes CR9 to conduct when its anode voltage exceeds its cathode voltage. The cathode voltage of CR9 is determined by the setting of BP1 ADJ, R53. When

CR9 conducts, some Linearizer Amplifier feedback current is bypassed through the -20V power supply. Consequently, this decrease in feedback current causes an increase in the gain of the forward breakpoint 1 portion of the tuning ramp. Also, the gain (slope) of the forward breakpoint 1 portion of the tuning ramp is determined by the setting of BP1 SLOPE ADJ, R55. In other words, BP1 ADJ varies the threshold voltage or the point of the tuning ramp where BP1 SLOPE ADJ becomes effective.

In contrast, a reverse breakpoint circuit decreases the gain of its particular portion of the tuning ramp. Since reverse breakpoint circuits 5 and 6 operate in a similar manner, only reverse breakpoint circuit 5 will be described in detail. As shown in Figure 4-3, CR13 is connected in parallel with feedback resistor R18. When CR13 conducts, the Linearizer Amplifier feedback current increases. As a result, the increase in feedback current causes a decrease in gain (slope) of the reverse breakpoint 5 portion of the tuning ramp. Also, the threshold voltage and gain of the reverse breakpoint circuit 5 can be varied by adjusting BP5 ADJ, R76, and BP5 SLOPE ADJ, R78, respectively.

Thus, the forward and reverse breakpoint circuits produce a shaped tuning ramp that is applied to the RF Section via the Hi and Lo Voltage-Tuned Oscillator Drivers (not shown).

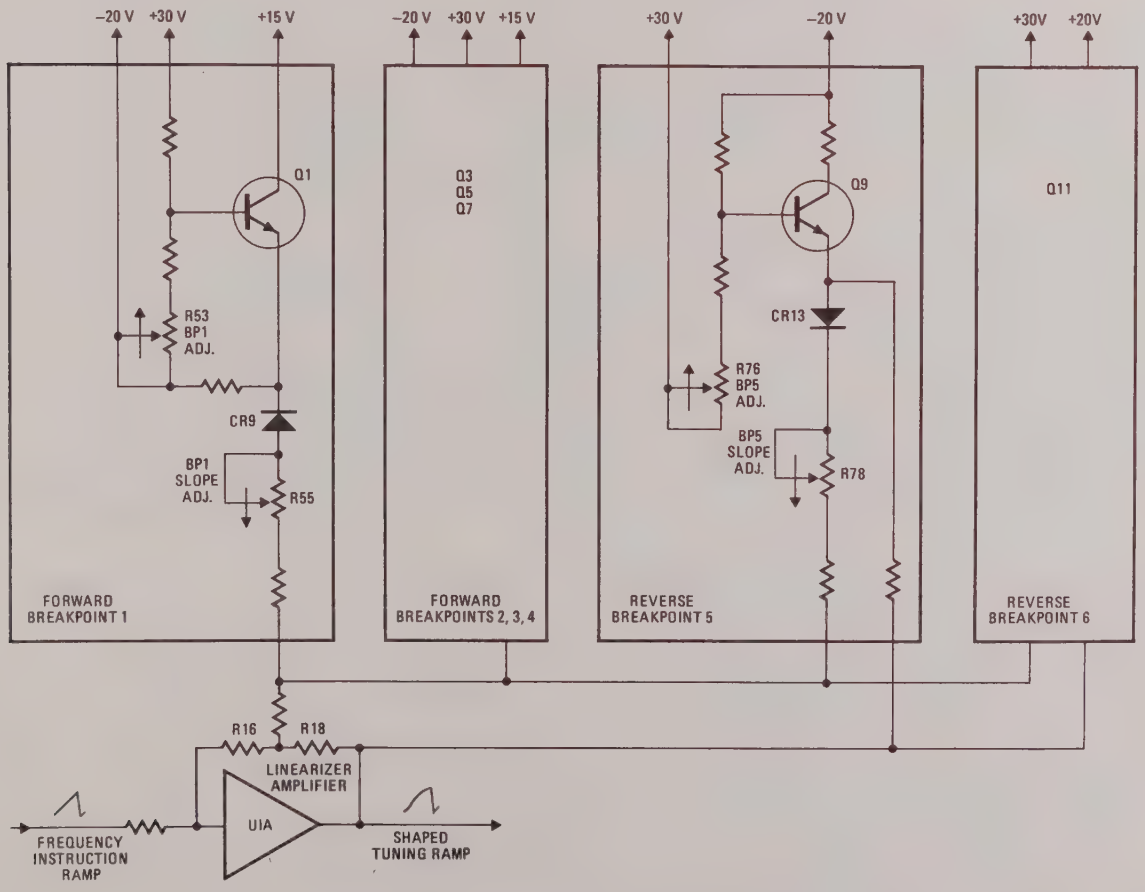


Figure 4-3. Linearizer Circuit, Detailed

Table 5-1. Recommended Test Equipment

INSTRUMENT	REQUIRED CHARACTERISTICS	MANUFACTURER
MAINFRAME	Calibrated per factory specifications	WILTRON Model 610D with Option 1
RF DETECTOR	50Ω: 75Ω:	WILTRON Model 73N50 WILTRON Model 73N75
EXTENDER CABLE	------	WILTRON P/N 610-MS-383
DIRECTIONAL DETECTOR	Frequency Range: 1 MHz - 2 GHz	WILTRON Model 710
POWER METER	50Ω Power Sensor: 75Ω Power Sensor:	HP Model 435A with HP Model 8482A HP Model 8483A
OSCILLOSCOPE	Bandwidth: 60 MHz, Sensitivity: 1mV	Tektronix Model 5440/5A48/5A42
FREQUENCY COUNTER	Frequency Range: 1 MHz - 1.5 GHz	EIP Model 350D
MODULATION METER	FM Measurement	Marconi Model TF2300
SPECTRUM ANALYZER	Frequency Range: 0 - 110 MHz: .01 - 18 GHz:	HP Model 140T with: HP Model 8553B HP Model 8555A
TRANSFORMER	75Ω to 50Ω	Anzac Model TPX-75-4
SOLDERING IRON	#6 or #7 Tip	Weller Model W-TCP
DIGITAL MULTIMETER	DC Voltage Range: To 30V	Fluke Model 8600A

SECTION V

PERFORMANCE VERIFICATION

5-1. INTRODUCTION

This section of the manual lists the test equipment and the procedures required to verify the performance of the Model 61084D RF Plug-In. Performance verification is divided into two parts: mainframe checks and RF plug-in checks. If either the mainframe or the RF plug-in fails to meet specifications, recalibration will be required. Recalibration information for the Model 61084D Plug-In can be found in Section VI, Maintenance.

5-1.1 Test Equipment

Table 5-1 (opposite page) lists the recommended test equipment for use in the performance verification and maintenance procedures. Other test equipment may be used, provided it meets or exceeds the required characteristics listed.

5-1.2 Test Environment

The RF plug-in and mainframe should be operated at an ambient temperature of 20°C to 30°C for optimum performance. Allow the system to warm up for at least one-half hour before beginning the performance verification procedures.

NOTE

If the calibration of the mainframe can be assured, the mainframe checks can be eliminated.

5-2. MAINFRAME CHECKS

The mainframe checks are divided into two parts: (1) Sweep Checks and (2) RF Power Leveling Checks. These checks verify that the mainframe is operating properly. If the system fails the Sweep Checks, the fault lies in the mainframe. If the system fails the RF Power Leveling Checks, the fault can be in either the mainframe or the Model 61084D RF Plug-In.

5-2.1 Mainframe Sweep Checks

a. Set the equipment controls as listed in Table 5-2.

b. Connect a cable from the HORIZ OUT of the mainframe to the Vertical Input of the oscilloscope.

c. On the oscilloscope, observe that the ramp amplitude is approximately +11.2V (Figure 5-1).

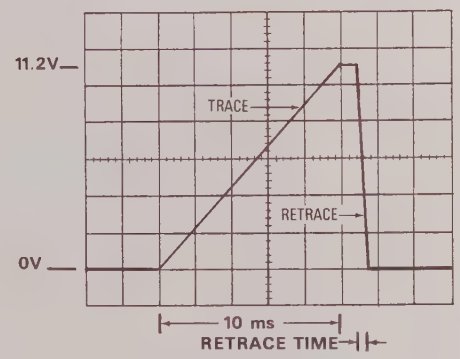


Figure 5-1. HORIZ OUT Waveform

d. On the oscilloscope, check that the duration of the ramp is 10 ms, and that the retrace time is approximately 10% of the duration of the ramp.

e. On the mainframe, set the SWEEP TIME control to each sweep time range. On the oscilloscope, check that the ramp for each sweep time range is equal to ±20% of the front panel value indicated by the SWEEP TIME control.

Table 5-2. Equipment Control Settings for the Mainframe Checks

Mainframe, Front Panel	
VAR FREQ MARKER:	INTENSITY
AMPLITUDE:	Fully CCW
SWEEP MODE:	AUTO
SWEEP TIME (SEC):	.1 - .01
VERNIER:	Fully CW
FREQ SELECTOR:	F1 TO F2
RETRACE RF:	OFF
F1:	0 MHz
F2:	1500 MHz
VAR FREQ MKR:	750 MHz
ΔF FREQ:	0 MHz
EXT ALC GAIN:	Midrange
LEVELING:	INT
HARMONIC MARKERS:	OFF
AMPLITUDE:	Fully CCW
WIDE/NARROW:	WIDE
POWER:	On
Mainframe, Rear Panel	
1 kHz:	OFF
FM/NORM:	NORM
61084D RF Plug-In	
10 dB Step Attenuator:	+10
1 dB Step Attenuator:	0
VERNIER:	Fully CCW
FREQUENCY RANGE:	1 - 1500 MHz
SLOPE ADJUST:	Midrange
RF:	ON
Oscilloscope	
Intensity:	As desired
Focus:	As desired
Vertical Input:	dc
Vertical Sensitivity:	2V/div
Vertical Input Polarity:	Positive
Horizontal Input:	dc
Horizontal Sweep:	2 ms/div

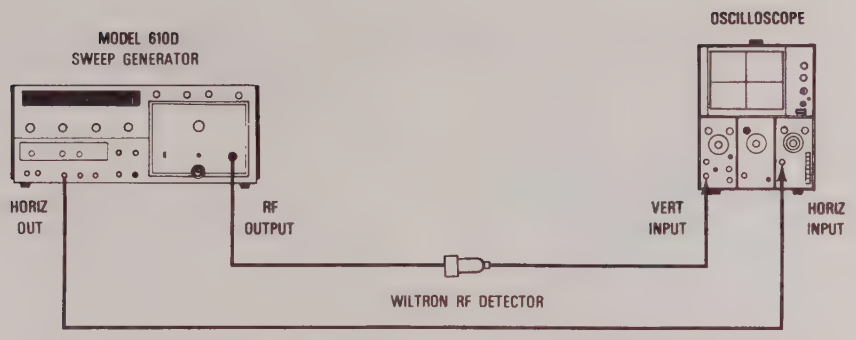


Figure 5-2. Test Setup for RF Power Leveling Checks

5-2.2 Mainframe RF Power Leveling Checks

a. Connect the equipment as shown in Figure 5-2.

b. Set the equipment controls as listed in Table 5-3.

c. On the oscilloscope, adjust the Vertical Position control to place the retrace on top of the top line of the graticule. Also, adjust the Horizontal Position and Horizontal Gain controls until the trace is 10 divisions wide and centered horizontally.

d. On the mainframe, set LEVELING switch to EXT. Check that the UNLEVELED light is now lit.

e. On the oscilloscope, note that the unleveled RF power is greater than the leveled RF power.

5-3. MODEL 61084D RF PLUG-IN CHECKS

The RF plug-in checks are performed in three parts: (1) Frequency Checks; (2) RF Power Leveling Checks; (3) Harmonics, Spurious, and Residual FM Checks. These procedures check that: (1) the START and STOP frequencies of the oscillator are within tolerance, (2) the RF power output meets specifications and is leveled across the entire band, and (3) any harmonics or spurious signals are below the rated output at specified levels. The residual FM is also checked.

5-3.1 RF Plug-In Frequency Checks

a. Connect the equipment as shown in Figure 5-3.

b. Set the equipment controls as listed in Table 5-3.

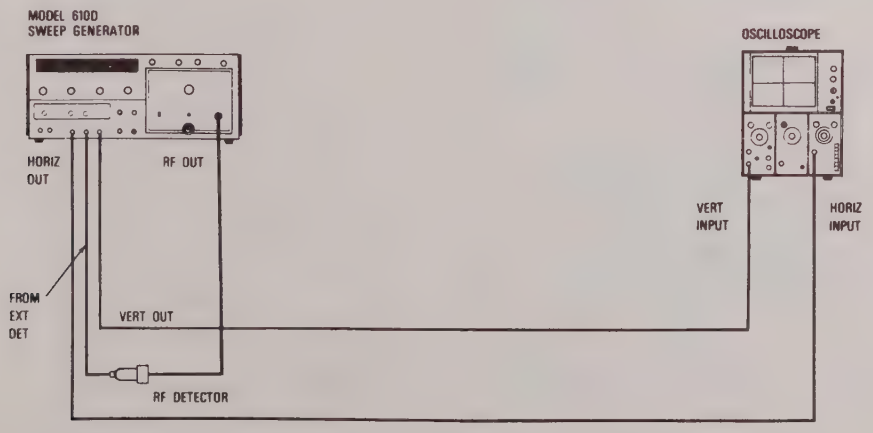


Figure 5-3. Test Setup for RF Plug-In Frequency Checks

Table 5-3. Equipment Control Settings for the RF Plug-In Checks

Mainframe, Front Panel	
VAR FREQ MARKER:	INTENSITY
AMPLITUDE:	Fully CCW
SWEEP MODE:	AUTO
SWEEP TIME (SEC):	.1 - .01
VERNIER:	Fully CW
FREQ SELECTOR:	F1 TO F2
RETRACE RF:	OFF
F1:	0 MHz*
F2:	1500 MHz*
VAR FREQ MKR:	0 MHz*
ΔF FREQ:	10
EXT ALC GAIN:	Midrange
LEVELING:	INT
HARMONIC MARKERS:	OFF
AMPLITUDE:	Fully CCW
WIDE/NARROW:	WIDE
POWER:	On
Mainframe, Rear Panel	
1 kHz:	OFF
FM/NORM:	NORM
61084D RF Plug-In	
10 dB Step Attenuator:	+10
1 dB Step Attenuator:	0
VERNIER:	Fully CCW
FREQUENCY RANGE:	1 - 1500 MHz
SLOPE ADJUST:	Midrange
RF:	ON
Oscilloscope	
Intensity:	As desired
Focus:	As desired
Vertical Sensitivity:	0.2V/div
Vertical Input:	dc
Vertical Input Polarity:	Positive
Horizontal Input:	dc
Horizontal Sweep:	2 ms/div

* The control must be set precisely on the indicated frequency marking.

c. On the oscilloscope, observe the full band sweep and adjust RF plug-in SLOPE ADJUST control so both ends of RF trace are at the same vertical height.

d. On the mainframe, set FREQ SELECTOR to ΔF. Set HARMONIC MARKERS to 1 MHz and set HARMONIC MARKER AMPLITUDE midrange.

e. On the oscilloscope, check that the zero beat is within ±12 MHz of the center of the graticule (Figure 5-4).

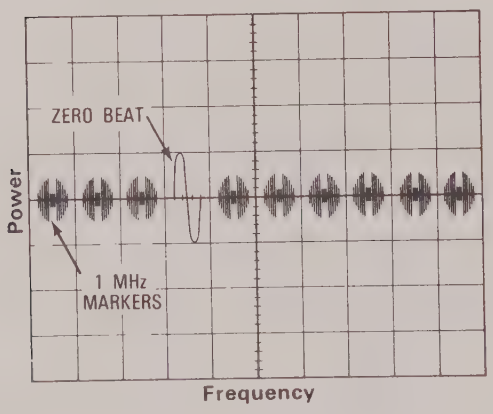


Figure 5-4. Zero Beat and 1 MHz Markers

f. On the mainframe, adjust the VAR FREQ MKR to set its dial pointer precisely to 100 MHz on the dial scale. Also, set HARMONIC MARKERS to 100 MHz.

g. On the oscilloscope, identify the 100 MHz marker of 100 MHz.

h. On the mainframe, set HARMONIC MARKERS to 1 MHz.

i. On the oscilloscope, check that the 1 MHz marker of 100 MHz is within ±12 MHz from the center of the graticule (Figure 5-5).

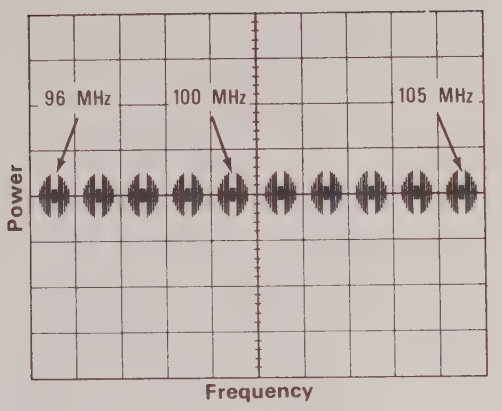


Figure 5-5. 1 MHz Marker of 100 MHz

j. On the mainframe, set HARMONIC MARKERS to 100 MHz. Also, adjust the VAR FREQ MKR to set its dial pointer precisely on the next 100 MHz marking on the dial scale.

k. On the oscilloscope, identify the 100 MHz marker.

l. On the mainframe, set HARMONIC MARKERS to 1 MHz.

m. On the oscilloscope, check that the 1 MHz marker is within ±12 MHz of the proper frequency from the center of the graticule.

n. Repeat steps j through m for each 100 MHz marking on the dial scale up to 1500 MHz.

o. On the RF plug-in, set the FREQUENCY RANGE switch to 1 - 500 MHz.

p. Repeat steps d through m up to 500 MHz.

5-3.2 RF Plug-In Power Leveling Checks

a. On the RF plug-in, connect the power meter to the RF OUTPUT connector.

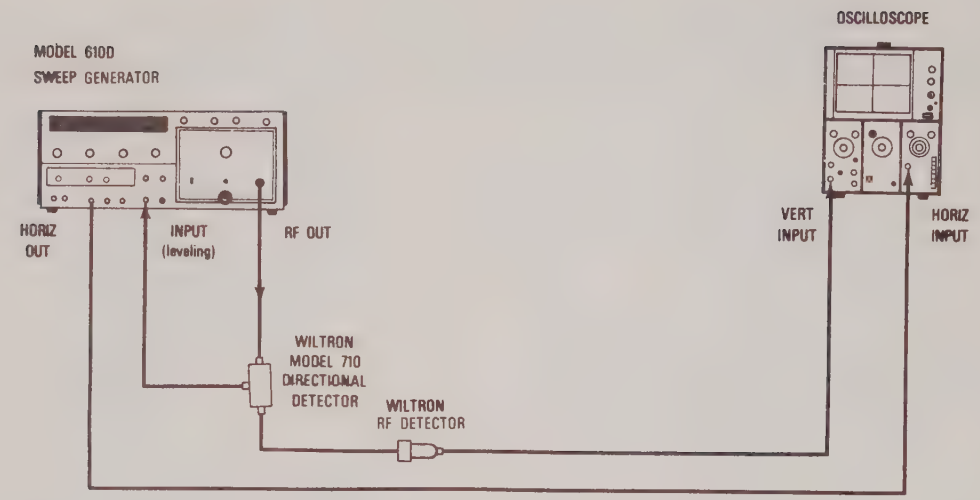


Figure 5-6. Test Setup for External Leveling Checks

b. Set the mainframe controls as listed in Table 5-3.

c. On the mainframe, set the FREQ SELECTOR to CW F1. Note the reading on the power meter.

d. On the mainframe, set the FREQ SELECTOR to CW F2. Note the reading on the power meter.

e. Repeat steps c and d and adjust the RF plug-in SLOPE ADJUST control so the two power meter readings are equal.

f. On the mainframe, set the FREQ SELECTOR to CW MKR. Also, tune the VAR FREQ MKR from 1 to 1500 MHz and note the highest and lowest power meter readings.

g. On the power meter, check that the difference between the highest and lowest power meter readings in step 3 does not exceed 0.4 dB.

h. On the mainframe, adjust the VAR FREQ MKR for a minimum power meter reading. Also, check that the minimum power reading is +10 dBm ±0.2 dB.

5-3.3 External RF Power Leveling Checks

a. Connect the equipment as shown in Figure 5-6.

b. Set the equipment controls as listed in Table 5-3.

c. On the mainframe, set the LEVELING switch to EXT.

d. On the oscilloscope, observe the RF trace and adjust the mainframe EXT ALC GAIN control for maximum leveled RF output.

e. On the RF plug-in, set the 1 dB Step Attenuator to each position and check on the oscilloscope for the presence of leveling loop oscillations as shown in Figure 5-7.

5-3.4 Harmonics, Spurious, and Residual FM Checks

a. Set the equipment controls as listed in Table 5-3.

b. On the mainframe, set the FREQ SELECTOR to CW MKR.

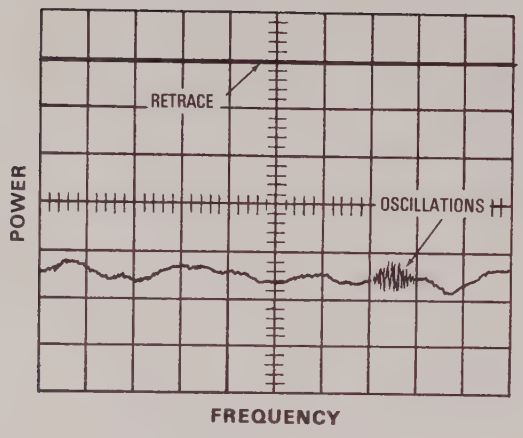


Figure 5-7. Oscillations in Leveling Loop

c. Check for harmonics:

1. On the spectrum analyzer, set the Input Attenuator to 50 dB.

2. On the RF plug-in, connect the RF OUTPUT to the Input of the spectrum analyzer.

3. On the mainframe, tune the VAR FREQ MKR from 1 to 1500 MHz, while tracking with the spectrum analyzer.

4. On the spectrum analyzer, check that harmonics are at least 20 dB down from the carrier from 1 to 5 MHz. Harmonics from 5 to 1500 MHz should be at least 30 dB down from the carrier.

d. Check for spurious:

1. On the mainframe, if Option 1 (Harmonic Markers) is installed, set HARMONIC MARKERS to OFF and turn HARMONIC MARKER AMPLITUDE fully CCW.

2. On the mainframe, tune the VAR FREQ MKR from 1 to 1500 MHz while tracking with the spectrum analyzer.

3. On the spectrum analyzer, check that all spurious are at least 45 dB down from the carrier.

e. Check Residual FM:

NOTE

Residual FM is measured with a peak-reading instrument with a 3 dB bandwidth of 30 Hz to 28 kHz. Because a spectrum analyzer does not meet this requirement, it should not be used for measuring residual FM.

1. As shown in Figure 5-8, connect the RF OUTPUT of the RF plug-in to the modulation meter.

2. On the mainframe, check that FREQ SELECTOR is set to CW MKR. Also, check that the VAR FREQ MKR is set to 750 MHz.

3. On the modulation meter, check that the residual FM does not exceed 7 kHz peak.

4. Set the VAR FREQ MKR to several other frequencies and check on the modulation meter that the residual FM does not exceed 7 kHz peak.

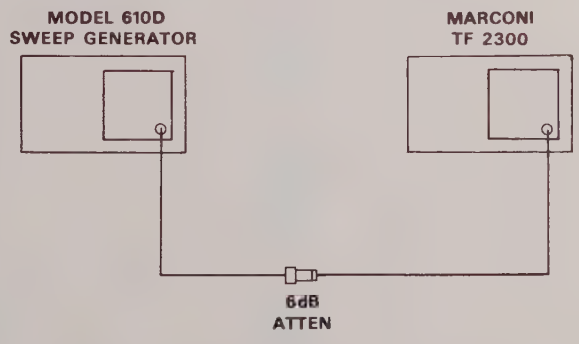


Figure 5-8. Test Setup for Residual FM Checks

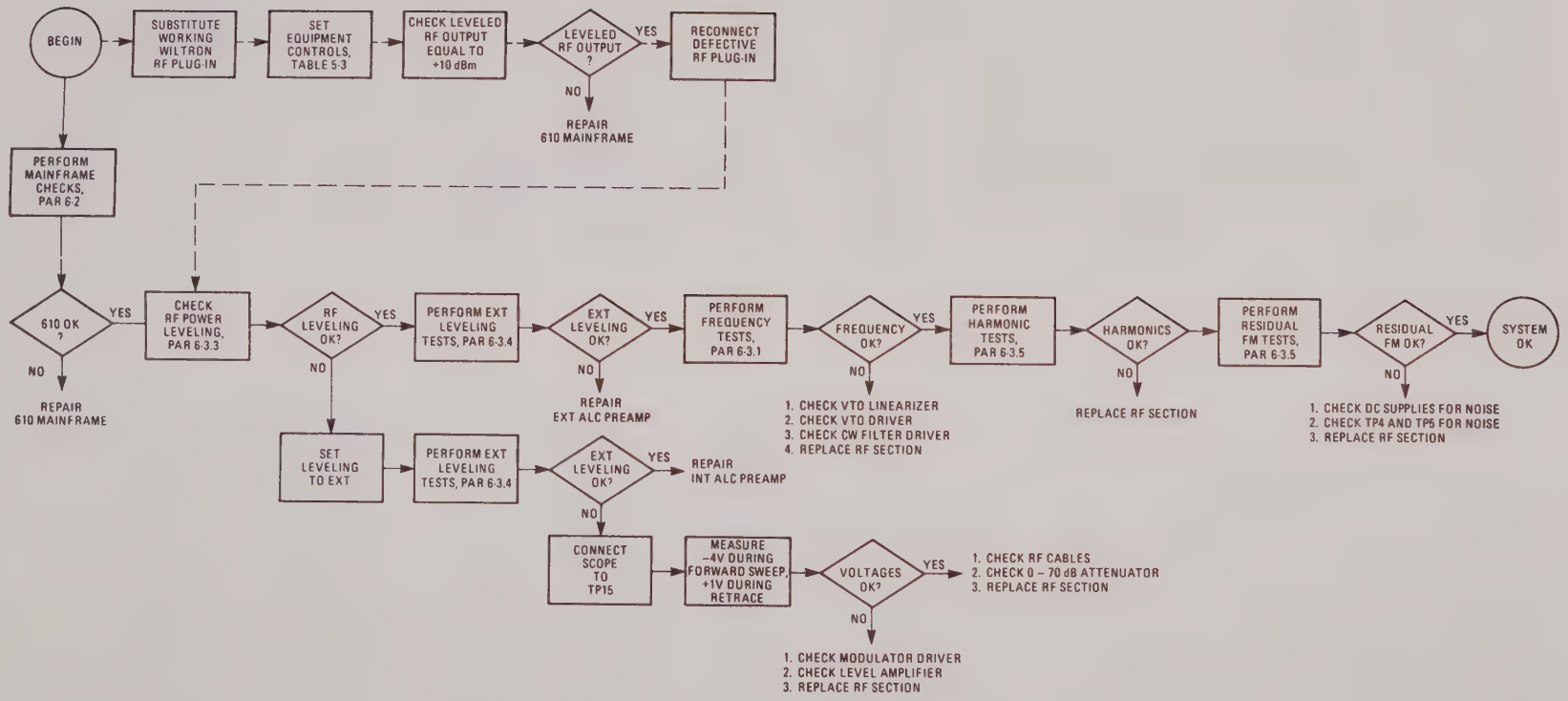


Table 6-1. Troubleshooting Chart for Model 61084D RF Plug-In

SECTION VI
MAINTENANCE

6-1. INTRODUCTION

This section provides recalibration procedures and a troubleshooting chart for the Model 61084D RF Plug-In. These procedures consist of two parts: (1) Mainframe Tests and Adjustments and (2) Plug-In Tests and Adjustments. Before performing the recalibration procedures, check that:

a. plug-in, device under test, external RF components, and cables have the same characteristic impedances.

b. RF plug-in cables and connectors are free of cracks and other defects.

c. good mechanical connections exist between cables, connectors, adapters, and terminations.

The recalibration procedures should be performed in sequence because an adjustment of one circuit may affect the calibration of other circuits. Therefore, when trouble is encountered during a step in the procedure, the trouble must be corrected and the entire procedure should be repeated from the beginning. The troubleshooting chart, Table 6-1, can aid in isolating the defective section of the RF plug-in.

Additional troubleshooting aids, such as voltage levels and waveforms, can be found in the schematics in Section VIII.

6-1.1 Test Equipment

The test equipment listed in Table 5-1 can be used for all tests and adjustments in this section.

6-2. MAINFRAME TESTS AND ADJUSTMENTS

The mainframe tests and adjustments consist of the following: (1) DC Voltage Tests and Adjustments, (2) Sweep Tests and Adjustments, (3) RF Power Leveling Tests, and (4) Frequency Instruction Voltage Tests.

6-2.1 System Test Preparation

a. Remove the bottom cover of the mainframe.

b. Set the equipment controls as listed in Table 5-2.

Table 6-2. DC Voltage Tests

Test Point	Voltage (dc)	Tolerance (V)
E8	+30	±0.1
E13	-20	±0.1
TP9	+24	±0.75
TP6	+15	±0.45
TP8	-15	±0.45
TP7	+5	±0.25
TP10	-5	±0.25

6-2.2 DC Voltage Tests and Adjustments

a. On the plug-in, measure the dc voltages listed in Table 6-2 with a digital voltmeter (DVM). Make all measurements with respect to TP1 (GND). See Figure 6-1 for the location of the test points on the PC board.

b. If the -20V or +30V readings are out of tolerance, perform the Power Supply Calibration in paragraph 4-2.3 of the Model 610D Sweep Generator Instruction Manual.

c. If the Model 610D Mainframe power supply is adjusted, perform the Sweep Generator Calibration in paragraph 4-2.4 and the Frequency Instruction Calibration in paragraph 4-2.5 of the Model 610D manual.

6-2.3 Sweep Tests and Adjustments

a. Perform all steps in paragraph 5-2.1 (Mainframe Sweep Checks).

b. If either the sweep rate or the HORIZ OUT amplitude is out of tolerance, perform the Sweep Generator Calibration in paragraph 4-2.4 of the Model 610D Manual.

6-2.4 RF Power Leveling Tests

NOTE

If the RF power leveling circuitry is operating properly, these tests can be omitted.

a. Perform all steps in paragraph 5-2.2 (Mainframe RF Power Leveling Checks).

b. If the RF power leveling circuitry is out of tolerance, perform the steps in paragraph 6-3.3 (RF Power Leveling Tests and Adjustments).

6-2.5 Frequency Instruction Voltage Tests

NOTE

When an extender cable connects the plug-in to the mainframe, the dc level at wiring point E15 shifts 30 to 40mV.

a. On the plug-in, connect DVM between wiring point E15 and TP1 (Figure 6-1).

b. On the mainframe, set FREQ SELECTOR to CW F1. Also, adjust F1 control so

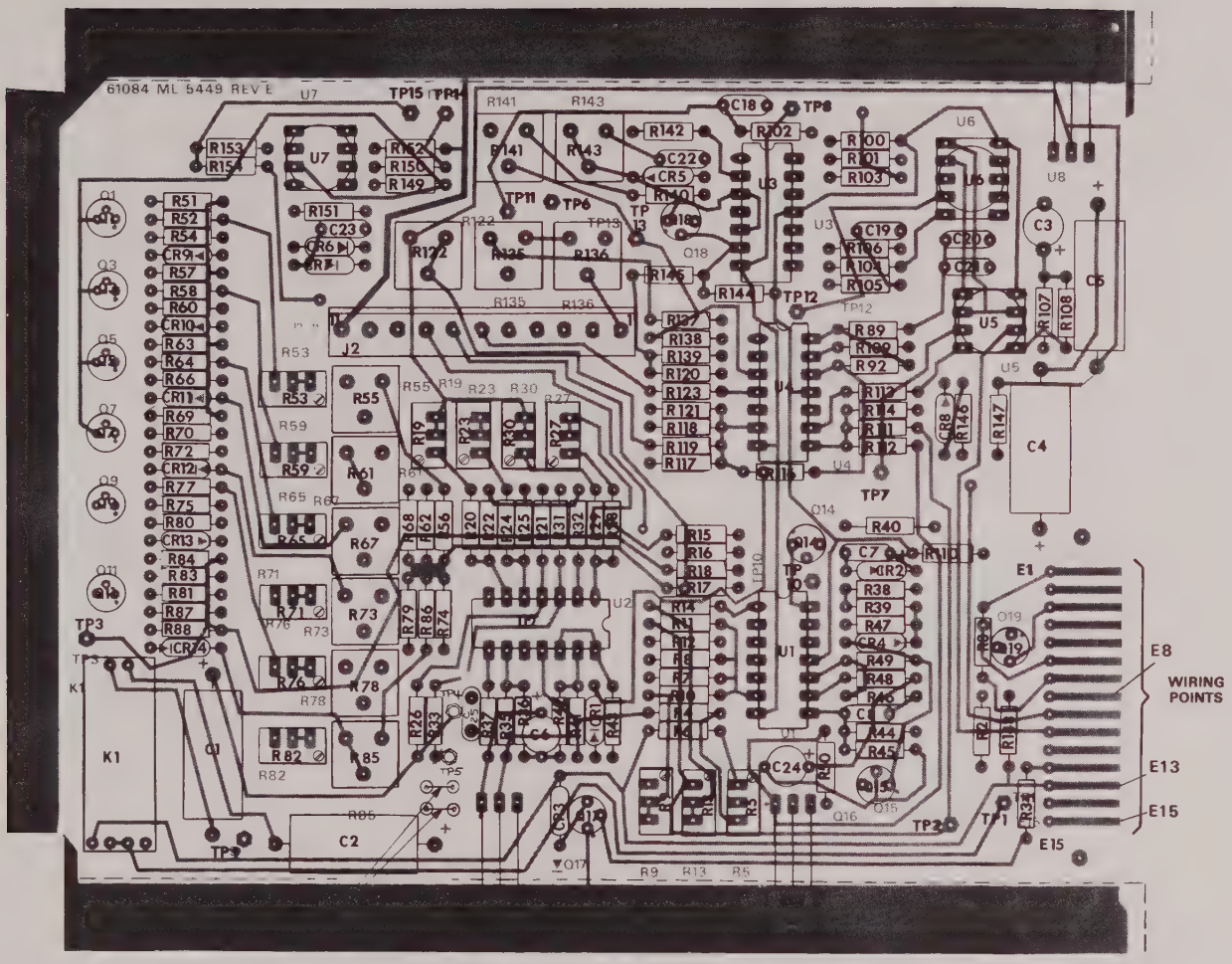


Figure 6-1. Model 61084D PC Board, Parts Location

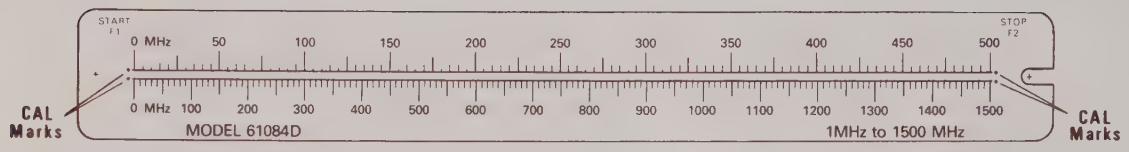


Figure 6-2. 61084D Dial Scale

DVM reads 0V ±5mV. Check that F1 dial pointer is set precisely on top of the CAL marks near the START F1 end of the dial scale (see Figure 6-2).

c. On the mainframe, set FREQ SELECTOR to CW MKR. Repeat step b using VAR FREQ MKR control and dial pointer instead of F1 control and dial pointer.

d. On the mainframe, set FREQ SELECTOR to CW F2. Repeat step b, using F2 control and dial pointer instead of F1 control and dial pointer.

e. On the mainframe, set FREQ SELECTOR to CW F1. Also, adjust F1 control so DVM reads +9.75V ±5mV. Check that F1 dial pointer is set precisely on top of the CAL marks near the STOP F2 end of the dial scale (see Figure 6-2).

f. On the mainframe, set FREQ SELECTOR to CW MKR. Repeat step e, using VAR FREQ MKR control and dial pointer instead of F1 control and dial pointer.

g. On the mainframe, set FREQ SELECTOR to CW F2. Repeat step e using F2 control and dial pointer instead of F1 control and dial pointer.

h. If the plug-in does not pass the Frequency Instruction Voltage Tests, perform the Frequency Instruction Calibration in paragraph 4-2.5 of the Model 610D Manual.

6-3. MODEL 61084D RF PLUG-IN TESTS AND ADJUSTMENTS

The Model 61084D RF Plug-In tests and adjustments consist of the following: (1) RF Plug-In Frequency Tests and Adjustments, (2) Voltage-Controlled Oscillator Linearization, (3) RF Power Leveling Tests and Adjustments, (4) External RF Power Leveling Tests, and (5) Harmonics, Spurious, and Residual FM Tests.

6-3.1 RF Plug-In Frequency Tests and Adjustments

a. Perform all steps in paragraph 5-3.1 (RF Plug-In Frequency Checks).

b. If frequency accuracy is out of tolerance, perform the necessary adjustments listed in Table 6-2.

6-3.2 Voltage-Controlled Oscillator Linearization

NOTE

If either the RF Section is replaced or the adjustments in paragraph 6-3.1 are unable to bring the frequency accuracy within tolerance, perform the following steps.

a. Connect equipment as shown in Figure 5-3.

Table 6-3. Voltage-Controlled Oscillator Linearization Adjustments

Frequency (MHz) (1)	Adjustment	Name
Frequency Range 1 - 500 MHz		
0 (2)	R5	ZERO FREQ CAL
500	R9	500 MHz CAL
Frequency Range 1 - 1500 MHz		
0 (2)	R19	HI VTO 1 MHz ADJ
100	R13	SLOPE ADJ
200	R53	BP 1 ADJ
300	R55	BP 1 SLOPE ADJ
400	R59	BP 2 ADJ
500	R61	BP 2 SLOPE ADJ
600-700	R65	BP 3 ADJ
800	R67	BP 3 SLOPE ADJ
800 (3)	R71	BP 4 ADJ
900 (3)	R73	BP 4 SLOPE ADJ
1000	R76	BP 5 ADJ
1100-1300	R78	BP 5 SLOPE ADJ
1300	R82	BP 6 ADJ
1400-1500	R85	BP 6 SLOPE ADJ

(1) Frequency calibration accuracy is ±4 MHz.

(2) When the FREQUENCY RANGE switch is in either position, the zero beat should shift less than 1 MHz.

(3) May not be necessary to use.

b. Set equipment controls as listed in Table 5-3.

c. On the plug-in, perform the following:

1. Unsolder one end of R17 from the PC board (see Figure 6-1 for the location of R17).

2. Perform the adjustments listed in Table 6-4.

3. Resolder R17 to the PC board.

4. Adjust fully CW all linearizer potentiometers listed in Table 6-3 (see Figure 6-1 for the location of linearizer potentiometers).

d. On the mainframe, perform the following:

1. Set FREQ SELECTOR to ΔF.

Table 6-4. RF Section Tuning Voltage Adjustments

Frequency Selector	Test Point	Adjustment	DVM Reading
CW F1	3	R5	0V ±50mV
CW F2	3	R13	10V ±50mV
CW F1	5	R30	1 MHz Lo VTO (1) tuning voltage
CW F2	5	R27	1500 MHz Lo VTO (1) tuning voltage
CW F2	4	R23	1500 MHz Hi VTO (1) tuning voltage
CW F1	4	R19	1 MHz ~~Lo~~ Hi VTO (1) tuning voltage

(1) The RF Section tuning voltages are located on the RF Section label. Figure 6-3 shows an example of an RF Section label.

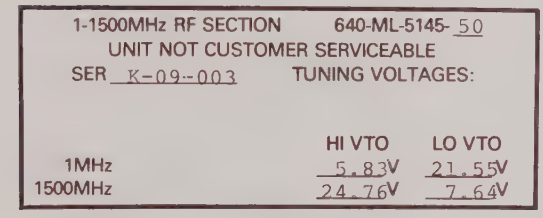


Figure 6-3. RF Section Label for Tuning Voltages

2. Set HARMONIC MARKERS to 1 MHz.

3. Set HARMONIC MARKERS AMPLITUDE midrange.

4. Check that VAR FREQ MKR pointer is set to 0 MHz on the dial scale.

e. On the plug-in, perform the following:

1. Set FREQUENCY RANGE switch to 1-1500 MHz.

2. Adjust R19 so the zero beat is within ±4 MHz of the center of the graticule of the oscilloscope (Figure 6-4).

3. Set FREQUENCY RANGE switch to 1-1500 MHz.

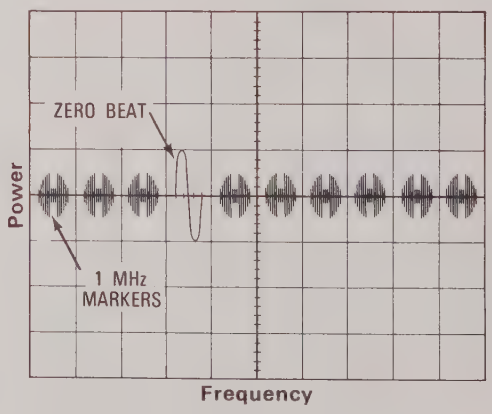


Figure 6-4. Zero Beat and 1 MHz Markers

4. Adjust R5 so the zero beat is within ±4 MHz of the center of the graticule.

f. On the mainframe, set HARMONIC MARKERS to 100 MHz. Also, adjust VAR FREQ MKR to set its dial pointer precisely to 100 MHz on the dial scale.

g. On the oscilloscope, identify the 100 MHz marker of 100 MHz.

h. On the mainframe, set HARMONIC MARKERS to 1 MHz.

i. On the plug-in, adjust R13 so the 1 MHz marker of 100 MHz is within ±4 MHz of the center of the graticule (see Figure 6-5).

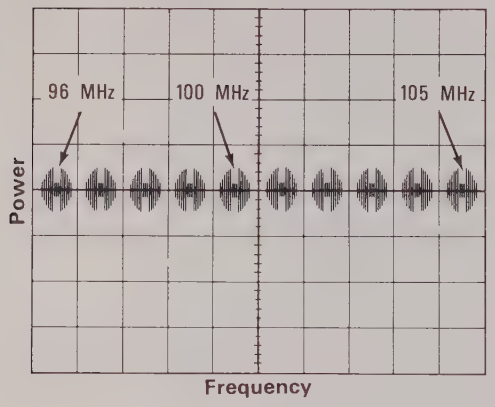


Figure 6-5. 1 MHz Marker of 100 MHz

j. On the mainframe, set HARMONIC MARKERS to 100 MHz. Also, set VAR FREQ MKR to the next 100 MHz marking on the dial scale.

k. On the oscilloscope, identify the 100 MHz marker.

l. On the plug-in, adjust the appropriate linearizer potentiometer listed in Table 6-3 so the 100 MHz marker is in the center of the graticule.

m. On the mainframe, set HARMONIC MARKERS to 1 MHz.

n. On the RF plug-in, adjust the appropriate linearizer potentiometer so the 1 MHz marker is within ±4 MHz of the center of the graticule.

o. Repeat steps j through n for each 100 MHz marking on the dial scale up to 1500 MHz.

p. On the plug-in, set FREQUENCY RANGE switch to 1-500 MHz.

q. On the mainframe, set VAR FREQ MKR to 500 MHz. Also, set HARMONIC MARKERS to 100 MHz.

r. On the oscilloscope, identify the 100 MHz marker of 500 MHz.

s. On the mainframe, set HARMONIC MARKERS to 1 MHz.

t. On the plug-in, adjust R9 so the 1 MHz marker of 500 MHz is within ±4 MHz of the center of the graticule.

u. Repeat steps d through t.

NOTE

Step v must be performed with the plug-in installed in the mainframe.

v. Perform all steps in paragraph 5-3.1 (RF Plug-In Frequency Checks).

6-3.3 RF Power Leveling Tests and Adjustments

a. Perform all steps in paragraph 5-3.2 (RF Plug-In Power Leveling Checks).

b. If the RF power leveling is out of tolerance, perform the following seven steps:

1. On the mainframe, adjust VAR FREQ MKR to set its dial pointer precisely to 750 MHz on the dial scale. Also, set FREQ SELECTOR to CW MKR.

2. On the plug-in, adjust R122 for a +10 dBm reading on the power meter (see Figure 6-1 for the location of R122).

3. On the plug-in , set 1 dB Step Attenuator to -9. Also, adjust R136 for a +1 dBm reading on the power meter.

4. On the plug-in, set the 1 dB Step Attenuator to each setting from -9 to 0.

5. On the power meter, observe the tracking of the 1 dB Step Attenuator. Tracking accuracy should be within ±0.2 dB.

6. On the plug-in, adjust R135 for optimum tracking at all positions on the 1 dB Step Attenuator (Figure 6-1).

7. Repeat steps 2 through 6.

c. Connect equipment as shown in Figure 5-2.

d. Set equipment controls as listed in Table 5-3.

e. On the mainframe rear panel, set 1 kHz switch to ON.

f. On the oscilloscope, observe the response of the square wave.

g. On the plug-in, adjust R141 and R143 for less than 10% overshoot and for the fastest rise time of the square wave (Figure 6-1).

h. Repeat step a.

6-3.4 External RF Power Leveling Tests

a. Perform all steps in paragraph 5-3.3 (External RF Power Leveling Checks).

b. On the mainframe rear panel, set 1 kHz switch to ON.

c. On the oscilloscope, observe the square wave response. Check that the overshoot of the square wave is less than 10% and that there are no oscillations on the square wave.

6-3.5 Harmonics, Spurious, and Residual FM Tests

a. Perform all steps in paragraph 5-3.4 (Harmonics, Spurious, and Residual FM Checks).

b. If the harmonics or spurious are out of specification then replace the RF Section (see Figure 6-6 for location of RF Section).

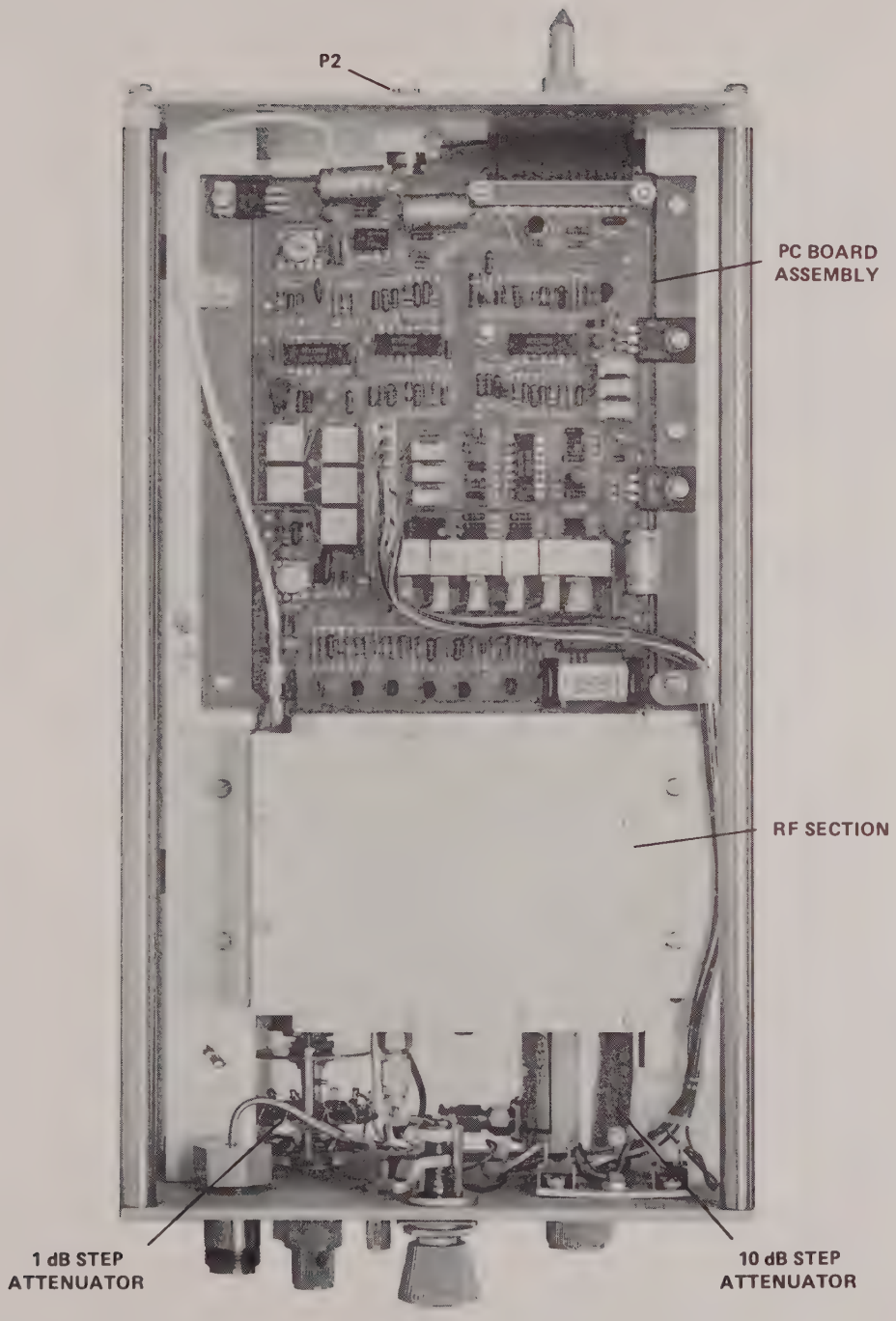


Figure 6-6. Model 61084D RF Plug-In, Bottom View

SECTION VII
PARTS LIST

7-1. GENERAL

This section contains the parts list for the WILTRON Model 61084D RF Plug-In. The WILTRON part number, part description, and reference designator are included for each component on the schematics. Items such as machined parts and chassis are not included, but they may be ordered from WILTRON by special request.

7-2. ORDERING REPLACEABLE PARTS

Replaceable parts may be ordered either through your local representative or directly from:

WILTRON Company
825 East Middlefield Road
Mountain View, California 94043

Telephone: (415) 969-6500
TWX: 910-379-6578

When placing your order, give the following information: model and serial number of the instrument, part description, WILTRON part number, and quantity required.

7-3. PARTS LIST

The Parts List, Table 7-1, is organized as follows: Main PC Assembly, Front Panel Assembly, RF Components, and Hardware.

Table 7-1. Replaceable Parts

REF. DES.	WILTRON PART NO.	DESCRIPTION
		61084 PC Assembly
		NOTE: Unless otherwise specified, all capacitances are in microfarads.
C1	250-51	Capacitor: Electrolytic, 47, 63V
C2	250-51	Capacitor: Electrolytic, 47, 63V
C3	250-42A	Capacitor: Tantalum, 10, 25V
C4	250-51	Capacitor: Electrolytic, 47, 63V
C5	250-51	Capacitor: Electrolytic, 47, 63V
C6	250-42A	Capacitor: Tantalum, 10, 25V
C7	250-19	Capacitor: Tantalum, 1, 35V
C8	230-11	Capacitor: Ceramic, .01, 100V
C9	230-31	Capacitor: Ceramic, .001, 500V
C10	230-31	Capacitor: Ceramic, .001, 500V
C11	230-31	Capacitor: Ceramic, .001, 500V
C12	230-31	Capacitor: Ceramic, .001, 500V
C13	230-31	Capacitor: Ceramic, .001, 500V
C14	230-31	Capacitor: Ceramic, .001, 500V
C15	230-31	Capacitor: Ceramic, .001, 500V
C16	230-31	Capacitor: Ceramic, .001, 500V
C18	230-33	Capacitor: Ceramic, .002, 500V
C19	230-33	Capacitor: Ceramic, .002, 500V
C20	230-32	Capacitor: Ceramic, .033, 50V
C21	230-32	Capacitor: Ceramic, .033, 50V
C22	230-36	Capacitor: Ceramic, .0047, 100V
C23	220-10	Capacitor: Mica, 10ρF, 300V
C24	250-41	Capacitor: Tantalum, 6.8, 30V
C25	230-30	Capacitor: Ceramic, .001, 50V
CR1	10-1N4736	Diode: Zener, 6.8V, 1W
CR2	10-1N4736	Diode: Zener, 6.8V, 1W
CR3	10-1N4446	Diode: Silicon
CR4	10-1N4446	Diode: Silicon
CR5	10-FD300	Diode: Silicon
CR6	10-1N4446	Diode: Silicon
CR7	10-1N4446	Diode: Silicon
CR8	10-1N4749	Diode: Zener, 24V, 1W, 10%
CR9	10-1N4446	Diode: Silicon
CR10	10-1N4446	Diode: Silicon
CR11	10-1N4446	Diode: Silicon
CR12	10-1N4446	Diode: Silicon
CR13	10-1N4446	Diode: Silicon
CR14	10-1N4446	Diode: Silicon
J2	551-86	Connector: 11 Pin
K1	690-14	Relay: DPST
Q1	20-2N3694	Transistor: NPN
Q3	20-2N3694	Transistor: NPN
Q5	20-2N3694	Transistor: NPN
Q7	20-2N3694	Transistor: NPN
Q9	20-2N3694	Transistor: NPN
Q11	20-2N3694	Transistor: NPN
Q13	20-2N6044	Transistor: NPN, Darlington
Q14	20-2N2907A	Transistor: PNP
Q15	20-2N3904	Transistor: NPN
Q16	20-2N6041	Transistor: PNP
Q17	20-2N3906	Transistor: PNP
Q18	20-2N3906	Transistor: PNP
Q19	20-2N3904	Transistor: NPN
		NOTE: All resistances are in ohms.
R2	110-475-1	Resistor: MF, 475, 1/4W, 1%
R3	110-1.07k-1	Resistor: MF, 1.07k, 1/4W, 1%
R4	110-196k-1	Resistor: MF, 196k, 1/4W, 1%
R5	157-20kA	Resistor: Variable, 20k
R6	110-121k-1	Resistor: MF, 121k, 1/4W, 1%
R7	110-90.9k-1	Resistor: MF, 90.9k, 1/4W, 1%
R8	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R9	157-1k	Resistor: Variable, 1k
R10	110-4.75k-1	Resistor: MF, 4.75k, 1/4W, 1%
R11	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R12	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R13	157-5kA	Resistor: Variable, 5k
R14	110-9.09k-1	Resistor: MF, 9.09k, 1/4W, 1%
R15	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R16	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R17	101-5.1-5	Resistor: CC, 5.1, 1/4W, 5%
R18	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R19	157-20kA	Resistor: Variable, 20k
R20	110-21.5k-1	Resistor: MF, 21.5k, 1/4W, 1%
R21	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R22	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R23	157-5kA	Resistor: Variable, 5k
R24	110-1k-1	Resistor: MF, 1k, 1/4W, 1%
R25	110-6.19k-1	Resistor: MF, 6.19k, 1/4W, 1%
R26	110-1k-1	Resistor: MF, 1k, 1/4W, 1%
R27	157-5kA	Resistor: Variable, 5k
R28	110-9.09k-1	Resistor: MF, 9.09k, 1/4W, 1%
R29	110-11k-1	Resistor: MF, 11k, 1/4W, 1%
R30	157-10kA	Resistor: Variable, 10k
R31	110-14.7k-1	Resistor: MF, 14.7k, 1/4W, 1%
R32	110-4.64k-1	Resistor: MF, 4.64k, 1/4W, 1%
R33	110-1k-1	Resistor: MF, 1k, 1/4W, 1%
R34	110-19.6k-1	Resistor: MF, 19.6k, 1/4W, 1%
R35	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R36	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R37	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R38	110-14.7k-1	Resistor: MF, 14.7k, 1/4W, 1%
R39	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R40	102-750-5	Resistor: CC, 750, 1/2W, 5%
R41	110-24.9k-1	Resistor: MF, 24.9k, 1/4W, 1%
R42	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R43	110-1k-1	Resistor: MF, 1k, 1/4W, 1%
R44	110-22.6k-1	Resistor: MF, 22.6k, 1/4W, 1%
R45	110-14.7k-1	Resistor: MF, 14.7k, 1/4W, 1%

Table 7-1. Replaceable Parts (Continued)

REF. DES.	WILTRON PART NO.	DESCRIPTION
R46	110-13.3k-1	Resistor: MF, 13.3k, 1/4W, 1%
R47	110-14.7k-1	Resistor: MF, 14.7k, 1/4W, 1%
R48	110-14.7k-1	Resistor: MF, 14.7k, 1/4W, 1%
R49	110-1.96k-1	Resistor: MF, 1.96k, 1/4W, 1%
R50	110-1.96k-1	Resistor: MF, 1.96k, 1/4W, 1%
R51	110-124k-1	Resistor: MF, 124k, 1/4W, 1%
R52	110-82.5k-1	Resistor: MF, 82.5k, 1/4W, 1%
R53	157-20kA	Resistor: Variable, 20k
R54	110-13.3k-1	Resistor: MF, 13.3k, 1/4W, 1%
R55	156-50kA	Resistor: Variable, 50k
R56	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R57	110-124k-1	Resistor: MF, 124k, 1/4W, 1%
R58	110-90.9k-1	Resistor: MF, 90.9k, 1/4W, 1%
R59	157-20kA	Resistor: Variable, 20k
R60	110-21.5k-1	Resistor: MF, 21.5k, 1/4W, 1%
R61	156-50kA	Resistor: Variable, 50k
R62	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R63	110-124k-1	Resistor: MF, 124k, 1/4W, 1%
R64	110-95.3k-1	Resistor: MF, 95.3k, 1/4W, 1%
R65	157-20kA	Resistor: Variable, 20k
R66	110-21.5k-1	Resistor: MF, 21.5k, 1/4W, 1%
R67	156-50kA	Resistor: Variable, 50k
R68	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R69	110-124k-1	Resistor: MF, 124k, 1/4W, 1%
R70	110-100k-1	Resistor: MF, 100k, 1/4W, 1%
R71	157-20kA	Resistor: Variable, 20k
R72	110-21.5k-1	Resistor: MF, 21.5k, 1/4W, 1%
R73	156-50kA	Resistor: Variable, 50k
R74	110-5,11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R75	110-16.2k-1	Resistor: MF, 16.2k, 1/4W, 1%
R76	157-20kA	Resistor: Variable, 20k
R77	110-100k-1	Resistor: MF, 100k, 1/4W, 1%
R78	156-50kA	Resistor: Variable, 50k
R79	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R80	110-4.64k-1	Resistor: MF, 4.64k, 1/4W, 1%
R81	110-16.2k-1	Resistor: MF, 16.2k, 1/4W, 1%
R82	157-20kA	Resistor: Variable, 20k
R83	110-75k-1	Resistor: MF, 75k, 1/4W, 1%
R84	110-3.48k-1	Resistor: MF, 3.48k, 1/4W, 1%
R85	156-50kA	Resistor: Variable, 50k
R86	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R87	110-4.64k-1	Resistor: MF, 4.64k, 1/4W, 1%
R88	110-3.48k-1	Resistor: MF, 3.48k, 1/4W, 1%
R89	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R92	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R100	101-680k-5	Resistor: CC, 680k, 1/4W, 5%
R101	110-4.22k-1	Resistor: MF, 4.22k, 1/4W, 1%
R102	110-2.15k-1	Resistor: MF, 2.15k, 1/4W, 1%
R103	110-1.78k-1	Resistor: MF, 1.78k, 1/4W, 1%
R104	110-9.09k-1	Resistor: MF, 9.09k, 1/4W, 1%
R105	110-2.15k-1	Resistor: MF, 2.15k, 1/4W, 1%
R106	110-1.78k-1	Resistor: MF, 1.78k, 1/4W, 1%
R107	101-10M-5	Resistor: CC, 10M, 1/4W, 5%
R108	101-10M-5	Resistor: CC, 10M, 1/4W, 5%
R109	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R110	110-100k-1	Resistor: MF, 100k, 1/4W, 1%
R111	110-19.6k-1	Resistor: MF, 19.6k, 1/4W, 1%
R112	110-61.9k-1	Resistor: MF, 61.9k, 1/4W, 1%
R113	110-9.09k-1	Resistor: MF, 9.09k, 1/4W, 1%
R114	110-19.6k-1	Resistor: MF, 19.6k, 1/4W, 1%
R116	110-10k-1	Resistor: MF, 10k, 1/4W, 1%
R117	110-1.33k-1	Resistor: MF, 1.33k, 1/4W, 1%
R118	110-42.2k-1	Resistor: MF, 42.2k, 1/4W, 1%
R119	110-42.2k-1	Resistor: MF, 42.2k, 1/4W, 1%
R120	110-3.16k-1	Resistor: MF, 3.16k, 1/4W, 1%
R121	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R122	156-20kA	Resistor: Variable, 20k
R123	110-1.96k-1	Resistor: MF, 1.96k, 1/4W, 1%
R135	156-100A	Resistor: Variable, 100
R136	156-200A	Resistor: Variable, 200
R137	110-22.1-1	Resistor: MF, 22.1, 1/4W, 1%
R138	110-301-1	Resistor: MF, 301, 1/4W, 1%
R139	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R140	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R141	156-20kA	Resistor: Variable, 20k
R142	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R143	156-20kA	Resistor: Variable, 20k
R144	110-14.7k-1	Resistor: MF, 14.7k, 1/4W, 1%
R145	110-121-1	Resistor: MF, 121, 1/4W, 1%
R146	110-2.15k-1	Resistor: MF, 2.15k, 1/4W, 1%
R147	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R148	110-2.15k-1	Resistor: MF, 2.15k, 1/4W, 1%
R149	101-680k-5	Resistor: CC, 680k, 1/4W, 5%
R150	110-5.11k-1	Resistor: MF, 5.11k, 1/4W, 1%
R151	110-27.4k-1	Resistor: MF, 27.4k, 1/4W, 1%
R152	110-4.64k-1	Resistor: MF, 4.64k, 1/4W, 1%
R153	110-432-1	Resistor: MF, 432, 1/4W, 1%
R154	110-4.22k-1	Resistor: MF, 4.22k, 1/4W, 1%
U1	54-RC4136	IC: Op Amp
U2	54-RC4136	IC: Op Amp
U3	54-RC4136	IC: Op Amp
U4	54-RC4136	IC: Op Amp
U5	50-6	IC: Op Amp
U6	50-DG200BA	IC: Analog Switch
U7	50-LM318	IC: Op Amp
U8	54-MC7915	IC: -15V Regulator
		61084D Front Panel Assembly
R115	145-25k	Resistor: Variable, 25k, (SLOPE ADJUST)
S1	430-61	Switch: DPDT (FREQUENCY RANGE)
S2	430-61	Switch: DPDT (RF ON/OFF)
---	61084-MS-5463	Switch: 1 dB Step Attenuator
---	1010-23	Switch: 10 dB Step Attenuator, 50 ohms
---	1010-24	Switch: 10 dB Step Attenuator, 75 ohms
---	710-51	Knob: 10 dB Step Attenuator
---	710-48	Knob: VERNIER
---	710-52	Knob: 1 dB Step Attenuator
---	61084-S-5452	Knob: SLOPE ADJUST
---	710-53	Knob: Latch
---	742-10	Latch

Table 7-1. **Replaceable Parts (Continued)**

REF. DES.	WILTRON PART NO.	DESCRIPTION
		61084D RF Components
---	640-ML-5145-50	RF Section, 50 ohms
---	640-ML-5145-75	RF Section, 75 ohms
---	640-MS-4633	Cable Assembly, RF Section to 10 dB Attenuator
---	61083-ML-756-1	Cable Assembly, 10 dB Attenuator to RF OUTPUT, 50 ohms
---	61083-ML-756-3	Cable Assembly, 10 dB Step Attenuator to RF OUTPUT, 75 ohms
---	61084-ML-5466	Cable Assembly, P2 to RF Section Mkr Out
		61084D Hardware
---	61084-MS-5460	61084D Dial Scale
---	61084-MS-5462	1 dB Step Attenuator Wiring Harness Assembly

Legend:

CC = Carbon Composition
MF = Metal Film

SECTION VIII

SCHEMATIC DIAGRAMS

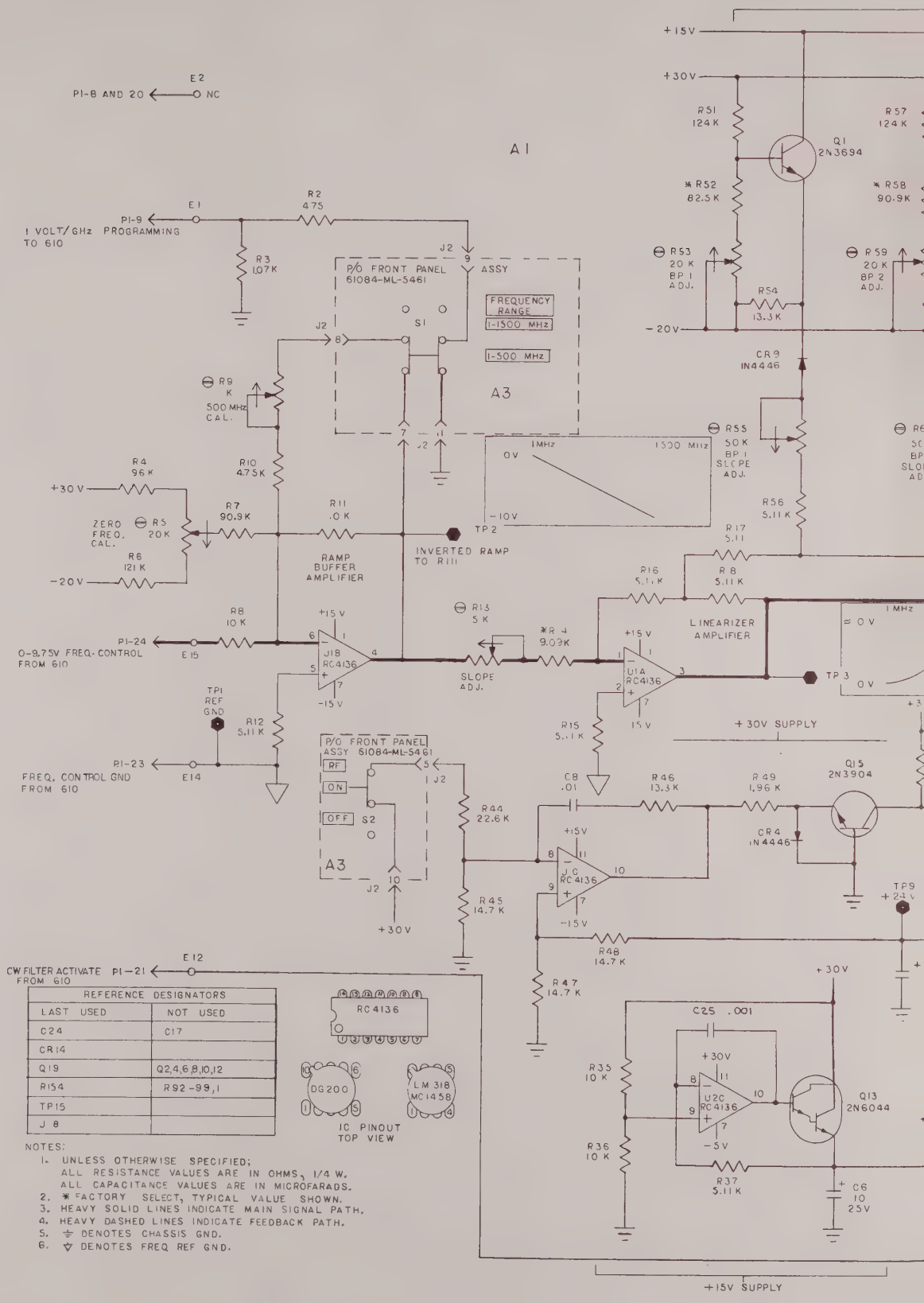
8-1. GENERAL

This section of the manual contains the schematic diagrams for the Model 61084D RF Plug-In.

Table 8-1 below lists the drawings included in this section.

Table 8-1. List of Schematic Diagrams

Figure	Title	Schematic No.
8-1	Model 61084D Schematic	61084D-100 (sheet 1 of 2)
8-2	Model 61084D Schematic	61084D-100 (sheet 2 of 2)



REFERENCE DESIGNATORS	
LAST USED	NOT USED
C24	C17
CR14	
Q19	Q2,4,6,8,10,12
R154	R92-99,1
TP15	
J 8	

NOTES:
1. UNLESS OTHERWISE SPECIFIED; ALL RESISTANCE VALUES ARE IN OHMS, 1/4 W. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
2. * FACTORY SELECT, TYPICAL VALUE SHOWN.
3. HEAVY SOLID LINES INDICATE MAIN SIGNAL PATH.
4. HEAVY DASHED LINES INDICATE FEEDBACK PATH.
5. ⏚ DENOTES CHASSIS GND.
6. ▽ DENOTES FREQ REF GND.

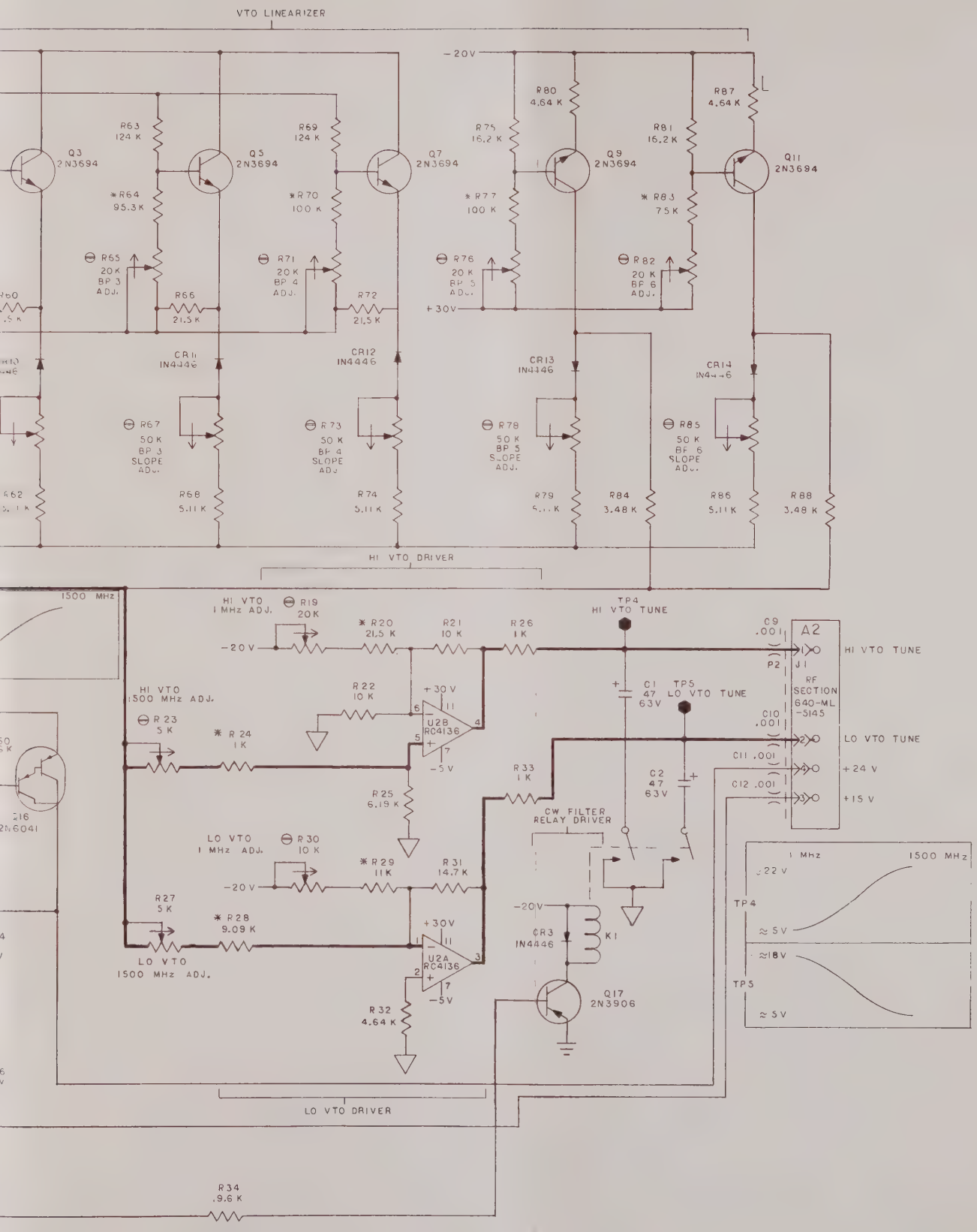
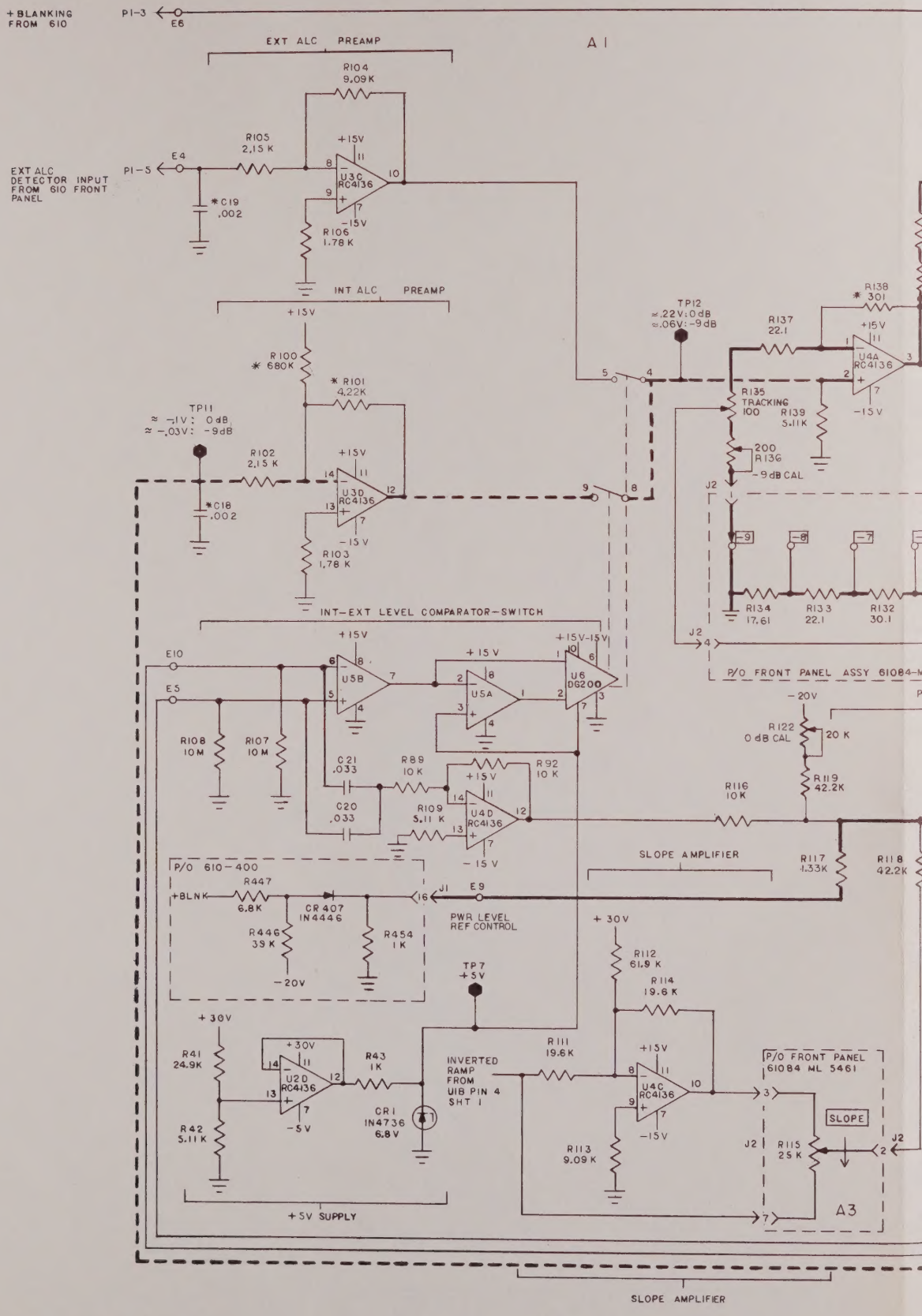


Figure 8-1. Model 61084D Schematic, 61084D-100 (Sheet 1 of 2)


+BLANKING FROM 610
P1-3
E6
EXT ALC PREAMP
A1
R104 9.09K
R105 2.15 K
E4
P1-5
EXT ALC DETECTOR INPUT FROM 610 FRONT PANEL
*C19 .002
U3C RC4136
+15V
-15V
R106 1.78 K
INT ALC PREAMP
R100 * 680K
* R101 4.22K
TP11 ≈ -.1V: 0dB ≈ -.03V: -9dB
R102 2.15 K
*C18 .002
U3D RC4136
R103 1.78 K
TP12 ≈.22V:0dB ≈.06V:-9dB
R137 22.1
R138 * 301
U4A RC4136
R135 TRACKING 100
R139 5.11K
200 R136 -9dB CAL
J2
-9
-8
-7
R134 17.61
R133 22.1
R132 30.1
P/O FRONT PANEL ASSY 61084-M
INT-EXT LEVEL COMPARATOR-SWITCH
E10
E5
U5B
U5A
U6 DG200
+15V-15V
R108 10M
R107 10M
C21 .033
C20 .033
R89 10K
R92 10K
R109 5.11 K
U4D RC4136
-20V
R122 0dB CAL 20 K
R119 42.2K
R116 10K
SLOPE AMPLIFIER
R117 1.33K
R118 42.2K
P/O 610-400
R447 6.8K
+BLNK
CR407 IN4446
R446 39K
R454 1K
J1
E9
PWR LEVEL REF CONTROL
TP7 +5V
+30V
R112 61.9 K
R114 19.6 K
R111 19.6K
INVERTED RAMP FROM U18 PIN 4 SHT 1
U2D RC4136
R43 1K
CR1 IN4736 6.8V
R41 24.9K
R42 5.11K
+5V SUPPLY
U4C RC4136
R113 9.09 K
P/O FRONT PANEL 61084 ML 5461
SLOPE
R115 25K
A3
SLOPE AMPLIFIER

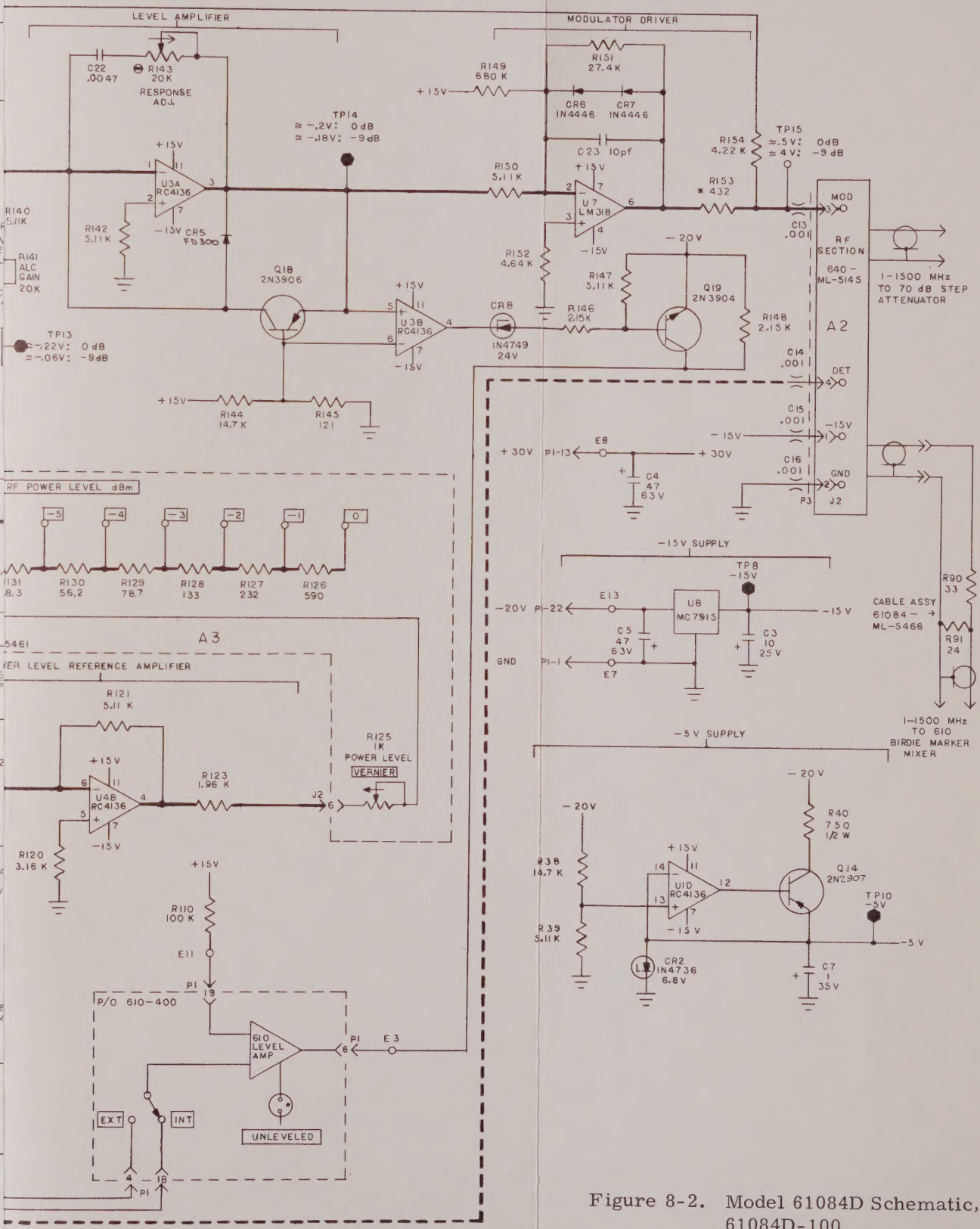


Figure 8-2. Model 61084D Schematic, 61084D-100 (Sheet 2 of 2)

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